IMPERIAL BUREAU OF ANIMAL HEALTH

THE

VETERINARY BULLETIN

Vol. 7.] April, 1937. [No. 4

DISEASES CAUSED BY BACTERIA AND FUNGI.

CUBEDDU, M. (1935). Osservazioni sulla mastite stafilococcica delle capre. [**Staphylococcic Mastitis of the Goat**].—*Clin. vet., Milano.* **58.** 79-83. [13 refs.]

C. concludes, from a clinical and bacteriological investigation, that a form of parenchymatous mastitis due to staphylococci exists among goats in Sardinia and recommends curative and preventive inoculation with an autogenous vaccine (said to have given excellent results experimentally) for the control of the disease.
—N. BISSET.

I. RAMON, G., & STAUB, A. (1936). Essais sur l'immunisation contre le charbon sur une nouvelle formule de vaccination charbonneuse. [**Immunization against Anthrax - a New Method**].—*Rev. Immunol.* **2.** 401-414. 1 table. [Numerous refs.]

II. VELU, H., & ZOTTNER, G. (1936). Persistance *in loco* et réactivation de spores charbonneuses atténuées. [**Persistence *in loco* and Reactivation of Attenuated Anthrax Spores after Inoculation**].—*C. R. Soc. Biol. Paris.* **122.** 256-257. [1 ref.]

I. Since none of the various methods of anti-anthrax immunization at present in use are free from an objection of some sort, the authors have sought to establish a simple single-dose method of inoculation which will be completely safe and reliable under all conditions.

In this article they describe a new vaccine consisting of a richly sporulating culture of *Bacillus anthracis*, attenuated to a degree corresponding to the first vaccine of Pasteur, suspended in (a) lanolin, or (b) a mixture of gelatin and alum. Either form of this vaccine, inoculated (subcut.) into sheep in a single dose, proved capable of inducing a solid and durable immunity within a few days. Full details of the method of preparation and use of the vaccine are given, together with the records of an extensive number of experimental inoculations.

II. V. and Z. refer to immunity experiments in which attenuated anthrax spores, incorporated in lanolin, were inoculated into rabbits. Live spores were isolated from these rabbits 23 days later [*V. B.* **6.** 5]. They then record an

experiment of their own in which attenuated anthrax spores inoculated into g. pigs persisted for 36 days. Subsequently, these spores recovered their lost virulence and caused the death of the g. pigs.—C. DAVENPORT.

I. STAMATIN, N., & STAMATIN, L. (1936). Le pouvoir immunisant des souches acapsulogènes de *Bacillus anthracis*. [**The Immunizing Power of Uncapsulated Colonies of** *B. anthracis*].—*C. R. Soc. Biol. Paris.* **122.** 491-493. [3 refs.]

II. STAMATIN, N., & STAMATIN, L. (1936). L'oedème apparaissant chez la souris après l'inoculation des variétés acapsulogènes de la bactéridie charbonneuse confère l'immunité au lapin. [**Immunizing Power of Oedema Fluid Caused in Mice by the Inoculation of Uncapsulated** *B. anthracis*].—*Ibid.* 494-495. [2 refs.]

III. RAMON, G., & STAUB, A. (1936). Sur un nouveau procédé de vaccination charbonneuse. [**A New Method of Anti-Anthrax Vaccination**].—*C. R. Acad. Sci., Paris.* **203.** 132-134. [2 refs.]

I. By the selection of colonies the authors obtained a strain of *B. anthracis* which did not become encapsulated when injected into mice and rabbits. The majority of the animals used for the experiment died, but those that survived were later found to be immune. It is concluded that the immunizing power of *B. anthracis* does not depend upon the possession of a capsule.

II. The fluid from the oedema produced in mice after the injection of suspensions of uncapsulated *B. anthracis* was diluted with saline and formolized. Using this emulsion, the authors were able to immunize a series of rabbits. They conclude that the immunizing power of the emulsion was due to the presence of aggressins, produced by the uncapsulated organisms.

III. Trials were carried out with an anthrax vaccine containing agar and alum. In one experiment ten sheep aged from five to six months were vaccinated, the vaccine being injected into the connective tissue underlying the skin of the thigh, in doses of 0·25 c.c. No general disturbance followed vaccination, but local lesions, varying from the size of a wheat grain to that of a hazel nut, appeared after an interval of 48 hours. Immunity was found to be complete six days after vaccination. Field trials gave similar results and the immunity was found to last for at least six months. The authors claim that the method can easily be employed in practice and that the rapid development of immunity which follows is of considerable practical importance. A vaccine equal in strength to Pasteur's first vaccine, containing 1% to 3% alum and agar 0·2%, is recommended for general use.—F. BLAKEMORE.

SCHAEFER, W. (1936). Dissociation de la bactéridie charbonneuse. [**Dissociation of the Anthrax Bacillus**].—*C. R. Soc. Biol. Paris.* **122.** 1178-1181. 1 table. [1 ref.]

In continuation of previous studies [*V. B.* **7.** 103.] S. carried out certain subcultivation and inoculation experiments with the organisms of the "R" colonies. He found that once these had been established in pure culture they maintained their special characteristics unaltered through successive transplantations. They proved to be almost avirulent for g. pigs and mice.—C. DAVENPORT.

I. FAULENBORG, G., & PLUM, N. (1936). Tuberkulose hos Hunden. [**Tuberculosis in Dogs**].—*Maanedsskr. Dyrlaeg.* **47.** 593-606. 3 tables. [Num. refs.]

II. PLUM, N. (1936). Tre Tilfaelde af Tuberkulose hos Hunden. [**Three Cases of Tuberculosis in Dogs**].—*Ibid.* **48.** 193-202. 2 figs. [4 refs.]

I. A survey of the occurrence of tuberculosis in dogs in different countries is given in a table. In Copenhagen, 5,110 *post-mortem* examinations were carried out on dogs from 1910 to 1935. 103 (2%) showed evidence of infection. During the last ten years the percentage has averaged only 0·9. The type of bacillus was determined in four cases. Two were infected with the human type and two with the bovine type.

II. Three new cases of tuberculosis in dogs are described. Two of them were caused by the human type, and one by the avian type of organism.

—H. C. Bendixen (Copenhagen).

I. Balteanu, I., Toma, A., & Garaguli, Ana. (1936). Essais de vaccination du cobaye par le BCG. Le BCG utilisé comme moyen curatif dans la tuberculose du cobaye. [**Vaccination and Treatment of Guinea Pigs by means of BCG**].—*Ann. Inst. Pasteur.* **57.** 152-170. [9 refs.]

II. Buxton, J. B., & Glover, R. E. (1936). **Preliminary Experiments in Calves on the Immunity Conferred by the Subcutaneous Inoculation of** *Mycobact. tuberculosis* **in Oily Excipients.**—*Rep. Inst. Anim. Path. Univ. Camb. 1934-1935.* pp. 251-261. 1 table. [Numerous refs.]

III. Buxton, J. B., Glover, R. E., & Griffith, A. S. (1936). **Duration of the Immunity Produced in Calves by the BCG Vaccine. I.**—*Ibid.* pp. 262-279. 7 tables. [Numerous refs.]

IV. Tang, F. F. (1936). **Studies of BCG Culture.**—*Chin. med. J.* Suppl. 1. pp. 186-194. 3 figs. on 2 plates, 2 tables. [17 refs.] [In English].

I. The authors have completed a series of experiments in the g. pig in which they have endeavoured to establish the most satisfactory method of administering BCG in multiple injections. The doses varied from 1 to 0·001 mg., the intervals ranged from one to ten days and the number of injections from 100 to 290. The solidity of the immunity was established by the inoculation of 0·000001 mg. of a virulent bovine strain. The best results were obtained with 100 daily doses of 0·01 mg. of BCG or with 0·1 mg. given every tenth day. In these groups, the vaccinated animals showed lesions limited to local lymph nodes, with only an occasional tubercle in the viscera.

Treatment of infected g. pigs with similar doses was, on the whole, without effect on the course of the disease, except in animals infected *per os.*

II. A preliminary series of experiments was undertaken with the object of determining whether the subcutaneous inoculation of calves with BCG, coated with gum acacia and incorporated in olive oil or liquid paraffin, would induce a reasonable degree of immunity against virulent tubercle bacilli given *per os.* Four calves were vaccinated, two receiving 5 mg. and two 50 mg. Well-marked local reactions resulted but, while the lesions induced by the paraffin suspensions were still marked nine months later, those resulting from the olive oil had practically disappeared.

The test dose was given six months after the vaccine and the animals were killed three months later. The controls showed moderate tuberculosis of the lymph nodes of the alimentary tract, while three vaccinated calves (two, olive oil and one, paraffin) were entirely immune. The fourth animal showed a single lesion in a mesenteric lymph node.

A similar experiment was also carried out on four calves, with oily suspensions of a virulent strain of the tubercle bacillus killed by formalin (1 g. and 0·5 g.). The results were not very encouraging since only one animal was completely immune. In addition, the local reactions were somewhat severe and persistent.

III. A similar article, in somewhat extended form, to one published previously [*V. B.* **5.** 685].

IV. Two strains of BCG from different sources were tested for pathogenesis on a large number of animals, by the subcutaneous and intraperitoneal routes. In the majority of these animals, massive doses were well tolerated, resulting in the formation of small local abscesses without lesions in other parts of the body. In a few, however, *viz*, one goat, three rabbits and five g. pigs, lesions closely resembling those of generalized tuberculosis were found at autopsy.

The efficacy of the vaccine was tested on several monkeys. The subcutaneous inoculation of BCG conferred a definite immunity against the ocular instillation of 0·0025 mg. of bovine culture, but the oral administration of the vaccine was without beneficial effect. Very little immunity was detected in g. pigs and rabbits, but it is pointed out that, as the infective dose was given intraperitoneally, it may have been too severe to permit of the detection of a slight protection.

It is concluded that, in the present state of our knowledge, it is doubtful whether BCG should be used on an extensive scale in China.

[It may be pointed out that the inoculation of normal animals with organ suspensions, from animals which showed generalized lesions after receiving massive doses of BCG, was without effect. There is no evidence, therefore, that BCG produced progressive tuberculosis].—R. E. Glover.

I. Loukidis, E., & Kielanowski, T. (1936). Étude comparative de la septicémie à bacilles tuberculeux aviaires chez le lapin immunisé et le lapin non immunisé. [**Tuberculous Bacillemia in Immunized and Non-Immunized Rabbits**].—*C. R. Soc. Biol. Paris.* **122.** 271-272. [3 refs.]

II. Saenz, A. (1936). Degré de virulence des souches aviaires (variété S) récemment isolées et formes anatomo-cliniques de la tuberculose expérimentale provoquée, par voie veineuse, chez la poule et le lapin. [**Nature of Experimental Tuberculosis induced in Fowls and Rabbits by the Intravenous Injection of Freshly Isolated Avian Strains (" S " Forms)**].—*Ibid.* 362-365. [6 refs.]

III. Saenz, A. (1936). Dissociation *in vitro* de la variété S en variété R et Ch des souches de bacilles tuberculeux aviaires récemment isolées. [**Dissociation of recently Isolated Avian " S " Strains of** *Mycobact. tuberculosis* **into " R " and " Ch " Types**].—*Ibid.* 1231-1234. [7 refs.]

IV. Feldman, W. H. (1936). **The Recoverability of Mycobacterium tuberculosis avium from experimentally Infected Guinea Pigs.**—*J. infect. Dis.* **59.** 1-5. [13 refs.]

V. Olson, C., Jr., & Feldman, W. H. (1936). **The Cellular Elements and Hemoglobin in the Blood of Chickens with Spontaneous Tuberculosis.**—*J. Amer. vet. med. Ass.* **89.** 26-34. 2 tables. [10 refs.]

VI. Glover, R. E., & Griffith, A. S. (1936). **Avian Tuberculosis in Cattle.**—*Rep. Inst. Anim. Path. Univ. Camb. 1934-1935.* pp. 94-102. 2 tables. [11 refs.]

I. Rabbits were immunized by the combined subcutaneous and intravenous inoculation of killed " S " forms of the avian type of *M. tuberculosis.* They were then inoculated (intraven.) with a living virulent strain and blood cultures were made at intervals. In unprotected controls a bacillaemia was present until the deaths of the animals whereas, in the vaccinated group, the organisms rapidly disappeared from the blood stream.

II. A general description is given of the types of lesion produced in the fowl and the rabbit by the intravenous injection of graded doses (10 to 0·0000001 mg.) of recently isolated avian cultures.

III. With the object of determining the best method of obtaining " R " forms

of the avian bacillus, recently isolated strains, which were uniformly composed of " S " elements, were sown on to different types of medium. On Löwenstein's medium, all the strains remained in the " S " phase. On glycerin potato some became rough, but further examination showed that they were not stable, as " S " forms were still recoverable while " Ch " types were not uncommon. Cultivation on Sauton's medium was the most favourable for the production of permanently dissociated forms.

In contra-distinction to the rough colonies of old-established avian cultures, these recently isolated " R " types were as virulent as the " S " type. This may have been due, however, to the instability of these cultures.

IV. A series of g. pigs was inoculated subcutaneously with a culture of the avian type of bacillus. The animals were killed in pairs at intervals varying from one to 70 days after inoculation, and the spleens were cultured. The organism was recovered from 8 out of 20 g. pigs killed up to the 21st day, while 13 out of 14 killed at the latter stages gave positive reactions.

V. Fowls affected with spontaneous tuberculosis were subjected to regular blood examinations, samples being taken on each of four successive days. The deviation from the normal was not very marked, but some degree of leucocytosis was noted, affecting more particularly the neutrophile leucocytes and the monocytes. The severity of the alterations corresponded approximately with the extent of tuberculosis as ascertained by *post-mortem* examinations.

VI. Three cases of bovine infection with the avian type of bacillus are described, in which the animals were obtained from two tuberculin-tested herds. The lesions, which appeared to be of a non-progressive type, were confined to the lymph nodes of the alimentary tract and consisted in the main of discrete caseo-calcareous foci. The nature of the infecting organisms was ascertained by cultural tests and the inoculation of g. pigs, rabbits, fowls and pigeons. In a fourth case, a single calcified lesion containing numerous acid-fast bacilli was found, but experimental animals inoculated from it remained free from tuberculosis. In all probability the bacilli were dead.

In three of these animals good reactions were obtained with avian tuberculin, but the animals also reacted, although to a slighter extent, to a mammalian tuberculin. In the case of one of the herds it was known that the cattle had been in contact with tuberculous fowls.—R. E. Glover.

I. Epstein, G. W., Ravich-Birger, E. D., & Svinkina, A. A. (1936). **Contributions to the Cytology of the Tubercle Bacillus.**—*G. Batt. Immun.* **16.** 1-27. 5 figs., 2 plates. [In English: French, German and Italian summaries].

II. Hotopp, Marion, & Kahn, M. C. (1936). **The Fate of Phagocytozed Acidfast Bacteria as Determined by the Single Cell Method. I. Polymorphonuclear Leucocytes.**—*J. infect. Dis.* **58.** 324-330. [7 refs.]

III. Goyal, R. K. (1936). Courbe du pH de certaines souches mammifères et aviaires de bacilles tuberculeux. [**The pH Curve of Certain Mammalian and Avian Strains of Tubercle Bacilli**].—*C. R. Soc. Biol. Paris.* **122.** 298-300. [4 refs.]

IV. Nedelkovitch, J. (1936). Contribution à l'étude du mode de multiplication du bacille de Koch. [**Methods of Multiplication of** *Mycobact. tuberculosis*]. —*Ann. Inst. Pasteur.* **57.** 170-192. 2 text figs., 24 figs. on 5 plates. [Numerous refs.]

I. The authors discuss the presence or absence of nuclear bodies in bacilli, and particularly in the tubercle bacillus. They refer to the work of Mellon *et al.*

(1932), who ascribed to the tubercle bacillus a nucleus, two chromosomes and a sexual process. They describe a staining technique which differentiates the bacillus into blue cytoplasm with red inclusions, and discuss the results in bacilli studied in this way.

II. H. and K. used the micro-droplet single-cell technique described by KAHN for bacteria. Polymorphonuclear leucocytes were obtained by the intraperitoneal injection of aleuronat into normal g. pigs, the exudate being collected in 18 to 24 hours in 0·05% heparin in Ringer's solution. Varying amounts of bacteria, suspended in the same solution, were added to the leucocytes in order to obtain an average ingestion of from one to three bacteria as determined by a modified Ziehl-Neelsen method. The leucocytes were then freed of all unphagocytozed bacteria by the micro-droplet process of washing, and at least 100 were seeded upon slopes of Petroff's medium after a varying period of incubation at 37°C.

An iguana strain of *M. marinum* remained viable within living polymorphonuclear leucocytes for about 20 hours, but the H-37 strain of *M. tuberculosis* was definitely affected within 18-24 hours. There was no growth of *B. subtilis* by this *in vitro* method, nor with a g. pig. *in vivo* method.

III. G. tested various strains of tubercle bacilli in 6% glycerinized and 1% glycerinized Sauton's medium in large and small flasks. Three old " R " eugonic bovine strains produced alkalinity, followed by strong acidity in normal medium. One of these gave strong alkalinity in 1% glycerin medium, and the constant breaking of the pellicle induced alkalinity in another. A recently dissociated " R " dysgonic bovine strain produced strong alkalinity. The fifth bovine strain (" R " dysgonic) produced a thin, complete pellicle in small flasks with alkaline reaction and a partial, thin pellicle in large flasks with no change of pH.

The human strain behaved in the same way as the old eugonic bovine strains, and the avian strains gave variable reactions irrespective of " R " and " S " characters.

IV. N. considers that in preparations of the tubercle bacillus, stained by the Ziehl-Neelsen method, a central protoplasm surrounded by a membrane and black granules can be demonstrated, the latter being spores.

He concludes that multiplication occurs by direct transverse division, and that as the protoplasm divides and grows faster than the membrane, a granular appearance is produced, each fragment representing a new bacillus and the whole a rudimentary colony. Primary and secondary divisions give rise to a structure resembling a chain of diplococci, any fragmentation, which is very easily brought about, generally occurring at the primary divisions.—C. V. WATKINS.

HARLAND, H. (1936). Próba prowokacyjna K. Panka i obraz krwi koni chorych na nosaciznę. **[The Blood Picture of Glandered Horses Subjected to Panek's Provocation Test].**—*Przegl. wet.* **49.** 211-225. 2 figs., 1 table, 5 graphs. [Numerous refs.] [German summary].

After injection (subcut.) of 1 c.c. of Panek's morvotensin into horses affected with latent glanders, specific swelling at the point of injection and of adjacent lymphatic vessels was noted, also fever, anorexia and prostration. A microscopic examination of the blood showed a marked leucocytosis with an increase of polymorphonuclear and neutral leucocytes, while the number of lymphocytes was noticeably reduced. Eosinophile and basophile leucocytes were absent, or only present in very small numbers. The leucocyte blood picture becomes, after the morvotensin test, similar to that in acute glanders.—K. SZCZUDŁOWSKI (Lwów).

HRUSKA, C. (1936). Vaccination contre la *Pasteurella* des porcs avec des microbes glucosidés non atténués. [**Vaccination against Swine Plague with Glucoside Cultures**].—*C. R. Soc. Biol. Paris.* **121.** 1316-1318. [1 ref.]

Broth, to which certain quantities of digitonin and saponin had been added, was sown with a strain of *Pasteurella suiseptica* and incubated for 48 hours. Injection into a rabbit of a dose of 0·5 c.c. of this culture produced a local necrotic lesion followed by death in from three to eight days. After this 48-hour culture had been stored in the dark for 20 days at room temperature, 20 rabbits were given the same dose (subcut.). Seventeen showed only a local reaction and two months after the injection were able to tolerate even large doses of virulent *P. suiseptica* culture. This immunity was shown to be specific for the porcine strain of *Pasteurella*. Broth cultures prepared from the glucoside cultures were found to have retained their virulence.—P. L. SHANKS.

EDWARDS, P. R. (1935). **A Serological Variant of** *Salmonella aertrycke* **Isolated from Pigeons.**—*J. Bact.* **30.** 465-471. 1 table. [11 refs.]

A serologic variant of *S. typhi-murium* (*aertrycke*) isolated from pigeons in three widely separated communities is described. It differs from *S. typhi-murium* in that its somatic antigen is similar to that of *S. abortus-equi*, thereby lacking one of the main somatic antigens. Its antigenic formula is as follows :– Somatic antigen IV ; specific flagellar antigen i ; non-specific flagellar antigen 1, 2, 3.

It is proposed to name the variant *S. aertrycke* var. *Storrs*.

[This formula is identical with that described by KAUFFMANN – (1934). *Z. Hyg. InfektKr.* **116.** 368. – and the organism is called by him *S. typhi-murium* var. *Copenhagen*. At a later date the author described serologic variants of *S. typhi-murium* and found that several cultures of *S. typhi-murium* var. *Binns* contained specific " H " antigens, but that they lacked the somatic " O " factor V. He proposed that the amended formula of this organism should be IV : i : 1, 2, 3., which is identical with the variants *Copenhagen* and *Storrs*].—R. LOVELL.

BRANDT, A. (1936). Paratyfus hos sølvrev. [**Paratyphoid in Silver Foxes**].—*Norsk VetTidsskr.* **48.** 279-281.

An appeal to veterinary surgeons in general practice to collaborate with the Veterinary Institute (Oslo) with a view to elucidating the mode of infection and spread of paratyphoid disease in silver foxes, especially cubs. B. gives a brief description of the chief symptoms, the course of the disease and *post-mortem* changes. The Institute offers polyvalent paratyphoid serum and vaccine free of charge to veterinarians who are willing to send in reports of the results obtained therewith. Instructions are given as to their use.—GUSTAV NAERLAND (OSLO).

BAHR, L. (1936). Sind die Salmonellabakterien imstande, andere toxische Substanzen als die sogenannten Endotoxine zu produzieren ? [**Toxin Production by Salmonella**].—*Zlb. Bakt. I.* (*Orig.*). **136.** 433-440. [11 refs.]

B. reports the production of a new thermostable toxic substance from certain members of the salmonella group. This substance is produced when the organisms are grown for 48 hours at 37°C. in a special meat substrate. It is produced in greatest amount from *S. paratyphi* B. After sterilization by boiling, it will kill white mice when given *per os*.—N. J. SCORGIE.

FAVILLI, G., & BIANCALANI, G. (1935). Recherches sur les substances hydrocarbonées des bactéries du groupe brucella. [**Carbohydrates of Brucella Group**].—*Rev. Microbiol., Paris.* **1.** 537-539.

Specific polysaccharide substances were obtained from members of the brucella group by heat extraction in aqueous solution. With suitable immune sera, precipitation was obtained with dilutions of the substances as high as 1 : 500,000. Only group specificity was exhibited. Extracts from *Br. abortus* and *Br. melitensis* often gave precipitation at higher dilutions with immune *Br. paramelitensis* sera than with the corresponding homologous sera. The reason for this is not clear at present, but may be due to the greater ease with which good precipitating sera can be prepared when *Br. paramelitensis* is employed.—N. J. SCORGIE.

I. WEINBERG, M., & GUILLAUMIE, M. (1936). Holosérum anti-*perfringens*. [**Anti-*perfringens* Holoserum**].—*C. R. Soc. Biol. Paris.* **122.** 1224-1227. 2 tables. [1 ref.]

II. BOSWORTH, T. J., & GLOVER, R. E. (1936). **The Effect on *Cl. welchii* Toxins of a Substance Present in the Normal Intestine.**—*Rep. Inst. Anim. Path. Univ. Camb. 1934-1935.* pp. 79-93. 11 tables. [13 refs.]

III. NICHOLSON, J. A. (1936). **Some Observations on the Physiological Actions of *Cl. welchii* Toxins.**—*Ibid.* pp. 212-226. 7 text figs., 11 figs. on 6 plates, 6 tables. [16 refs.]

IV. ROSE, S. B., ROSE, W. B., & KOLMER, J. A. (1936). **Vitamin B-Deficiency and Resistance to the Toxin of *B. welchii* in Rats.**—*J. infect. Dis.* **59.** 50-53. 2 tables. [7 refs.]

I. After testing the sera of horses injected with various mixtures of the toxins of *Clostridium welchii* of human and ovine origin, W. and G. conclude that it is possible to produce a well-balanced holoserum with a mixture of toxins of Types A, B and D. A similar result may be obtained by the following mixtures :– A + B + *ovitoxicum* toxin ; A + C + *ovitoxicum* toxin, and A + C + D. They conclude that Type B [lamb dysentery bacillus] and Type C [*Cl. paludis*] each contain antigens of Types B and C, and that Types D and *ovitoxicum* are similarly related to each other. [During the evolution of this multiple immunity, the various antisera form at different rates, and the curves of concentration for each generally vary considerably].

II. B. and G. used dried, precipitated toxins (method of Henry and Lacey), injected (intraven.) into mice, as test method for most of their experiments. They had previously found that a mixture of normal sheep intestinal filtrate (N.I.F.), with Type D toxin, caused a toxic effect in mice much in excess of the calculated D toxin content.

They found that the heat-stable portion of D toxin was probably concerned with this phenomenon because Types A and C toxins are not so affected. In the case of B toxin, a similar effect was obtained only when it contained some detectable heat-stable D factor.

B. and G. bring evidence to show that the activating substance in N.I.F. is trypsin. No actual increase in the amount of D toxin present in the mixture with N.I.F. occurred because accurately balanced toxin-antitoxin mixtures behaved in the same way when either normal or activated toxin was used.

They conclude that this effect of trypsin should be considered when assessing the amount of D toxin present in cases of enterotoxaemia of sheep.

III. N. used the same batches of dried precipitated toxins (method of Henry and Lacey), of Types A, B, C and D *Cl. welchii*, throughout his experiments. 1% solutions were made up in saline solution and used within one hour. He showed that any non-specific effects of these " crude " toxins are unlikely unless massive toxin-antitoxin mixtures are used.

All these toxins caused a marked rise in blood pressure when injected

(intraven.) into rabbits, the order of activity being C (greatest), B, D and A. By perfusing rabbit hearts N. showed that the action was due to constriction of the coronary arteries and depression of the conducting tissues, leading to heart-block with ventricular fibrillation just before the arrest of movement. The toxins also acted upon the respiratory and other higher nerve centres, and on smooth muscle. Respiration ceased before the heart stopped when D toxin was used, but this could not be determined in the case of the other toxins.

He showed that sublethal doses of one toxin caused tolerance to any of the other toxins.

Animals immunized with A or D toxins reacted the same as normal animals when injected with C and B toxins respectively, but the M.L.D. of the heterologous toxin was raised considerably.

He found that heated D toxin caused no rise in blood pressure, but merely a slowing of the heart and respirations, death following some hours later.

IV. As a result of experiments with two groups of rats fed upon a vitamin B-deficient diet, with controls receiving a similar (semi-starvation) amount of a fully balanced diet, the authors conclude that rats of known genetic and nutritional history are essential for this type of investigation, and that the degree of starvation was the factor which lowered the resistance of the rats to *Cl. welchii* toxin, and not the lack of vitamin B which merely produced inanition.—C. V. WATKINS.

I. SHAW, R. M., & SIMPSON, Gretta S. (1936). *Clostridium botulinum* **Type C. in relation to Duck Sickness in the Province of Alberta.**—*J. Bact.* **32.** 79-88. 3 tables. [3 refs.]

II. JERAMEC, C. (1936). Toxine et antitoxine botulique. [**Botulinus Toxin and Antitoxin**].—*Rev. Immunol.* **2.** 209-220. 1 table. [8 refs.]

III. ROSSI, P. (1936). L'urée sanguine dans le botulisme des bovidés. [**Blood Urea in Botulism in Cattle**].—*C. R. Soc. Biol. Paris.* **121.** 526-527.

I. A report of the investigation of an epidemic amongst wild ducks in Alberta, Canada, which was known locally as " wild duck sickness ". It was suspected that botulism was the cause and carcasses were therefore incubated at from 30° to 35°C. for three to six days. Thereafter tissue from these carcasses was seeded into cooked meat medium. Cultures isolated in this manner were purified by plating and pathogenicity methods ; as a result, a strain of *Cl. botulinum* was obtained. This strain produced a powerful toxin which was pathogenic for g. pigs and pigeons and produced symptoms of paresis. Tissue extracts from birds which had died of the disease contained a similar toxin. An antitoxin which was capable of neutralizing *Cl. botulinum* Type C toxin was prepared against this toxin. On the foregoing evidence it was concluded that the disease in ducks was caused by *Cl. botulinum* Type C.

II. A study of the immunization of g. pigs against the toxin of *Cl. botulinum* Types A and B. It is concluded that, in the practical immunization of human beings against botulism, combined active immunization with toxin and passive immunization with antitoxin for both Types A and B should be carried out as rapidly as possible.

III. The blood urea content of normal bovines lies between 0·3 and 0·5 g. per cent. During the course of botulism intoxication the content was found to rise to as high as 0·95 g. per cent. After treatment with specific antitoxic serum, this level fell again to normal in the course of ten days. The rise of the blood urea was accompanied by a corresponding fall in the amount of urea excreted in the urine.—E. J. PULLINGER.

BEARD, P. J., & SNOW, Jane E. (1936). **Antigenic Characteristics of Related Organisms after Cultivation on Synthetic Medium.**—*J. infect. Dis.* **59.** 40-42. 2 tables. [6 refs.]

Various species of related organisms were grown in a synthetic protein-free medium and in peptone beef broth, antigens and sera being prepared from each. Cross-agglutination tests with these would suggest that *Salmonella paratyphi* B (*Bact. schottmülleri*) and *S. typhi* are more closely related than are the latter and *S. pullorum.* It would appear from the somewhat limited data that biological relationships may vary with environment, or that what are regarded as inherent characters may be the result of environment.—A. W. TAYLOR.

I. MILIAN, & KARATCHENTZEFF. (1935). Epidémie de trichophytie propagée par un chat. Epidémie trichophytique à "Microsporum felineum". [**Epidemic of Trichophytosis Spread by a Cat. Trichophytic Epidemic Due to** *M. felineum*].—*Bull. Soc. franç. Derm. Syph.* **42.** 944-945 and 1357.

II. CATANEI, A. (1936). Premières recherches sur les teignes du chien en Algérie. [**Preliminary Research on Ringworm of Dogs in Algeria**].—*Arch. Inst. Pasteur Algér.* **14.** 104-108. 8 figs. on 2 plates. [1 ref.]

I. A three-month-old cat, affected with trichophytosis, was proved to be responsible for transmitting the disease to three persons within a period of ten days, the time between contact and infection in each case being five days. Infection in one instance was through the medium of a blouse. Mycelial filaments were readily demonstrated in squamae from the human lesions and in the hairs of the cat. The parasite, found to be *M. felineum*, developed rapidly on glucose agar and was evidently of exceptional virulence.

II. Preliminary research on canine ringworm in Algeria has revealed the existence of three types, *viz*, a microsporiasis due to *M. canis*, a trichophytosis due to *Ctenomyces mentagrophytes*, and a favus due to *Achorion schönleini.*

The microsporiasis was characterized by intense folliculitis and nodules from the size of a pea to that of a small nut, in one case localized on the head, and in another disseminated over the whole body.—NORMAN BISSET.

DISEASES CAUSED BY PROTOZOAN PARASITES.

I. MORCOS, Z. (1936). *Entamoeba histolytica* **in Dogs.**—*J. Egypt. med. Ass.* **19.** 63-64. [In English].

II. SPÉDER, E. (1936). Importance de l'examen radiologique pour le dépistage et l'étude de l'amibiase. [**Importance of X-Ray Examination in the Diagnosis and Study of Amoebiasis**].—*Rev. Path. comp.* **36.** 728-730.

III. ANDREWS, J., & WHITE, H. F. (1936). **An Epidemiological Study of Protozoa Parasitic in Wild Rats in Baltimore, with Special Reference to** *Endamoeba histolytica.*—*Amer. J. Hyg.* **24.** 184-206. 1 fig., 2 tables. [Numerous refs.]

I. Since 1929, the examination of dogs affected with diarrhoea and wasting has revealed only five cases. Only vegetative forms were seen in these cases; no cystic forms were seen. One case was successfully treated with three successive doses (subcut.) of 0·03 g. of emetine. Two others recovered after treatment with "Yatren 105" given daily for ten days.

II. Changes such as atrophy, tumefaction, ulceration and irritation were revealed by X-rays in the normal mucous lining of the intestines. It was found

that there was a sufficiently close and constant relation to amoeba infection to make the use of X-rays of value in diagnosis.

III. 2,500 live specimens of the common Norwegian rat, *Rattus norvegicus*, were caught and examined. *Trichomonas parva*, *Tryp. lewisi* and coccidia occurred more frequently in juvenile rats than in adults, and A. and W. consider that this indicates the occurrence of acquired immunity. The maximum incidence of coccidiosis was in the spring, of *Tryp. lewisi* in the summer and of *Trich. parva* in the summer and autumn. The extent of *Entamoeba histolytica* infection was negligeable. Other parasites also occurred.—R. FISHER.

SOULIÉ, F. (1936). Sur une nouvelle trypanosomose équine en Syrie. Considérations epidemiologiques. Essais d'identification. [**A New Trypanosome of Horses in Syria**].—*Bull. Soc. Path. exot.* **29.** 777-785. 2 figs. [5 refs.]

A disease characterized by symptoms previously unknown in the district appeared in a squadron of cavalry at Rihanié. Three further cases subsequently occurred in the Marais de Madek. Blood examinations revealed a trypanosome morphologically very similar to *Tryp. evansi*. The trypanosome occurs in the neighbouring territories. The dimensions are :– length 18–24μ, breadth 1–3μ according to level, small centrosome 1-3μ from posterior extremity, flagella 5μ and occasionally absent. Tabanids, mosquitoes and the Hippoboscidae are numerous and are suspected of being the vectors. Possibly an increase of the transmitting agents has caused a more active centre with a subsequent spread. Dogs, white rats, rabbits and possibly camels are susceptible. There are insufficient data at present to classify this trypanosome.—R. FISHER.

SUNDRAM, P. S. (1936). **The Incidence of Bovine Trypanosomiasis in Kurwai State, in Central India and in Saugor District in the Central Provinces.**—*Indian vet. J.* **12.** 325-333. 6 figs. on 2 plates, 4 tables. [5 refs.]

S. records his experiences during an outbreak of *Tryp. evansi* infection in cattle in Central India. Three forms of the disease were recognized, *viz*, an acute, a sub-acute and a chronic form. The symptoms of each are given. Loss of vision is recorded as a symptom of the acute form. 8,479 wet blood smear examinations were made. The infection and mortality rate in buffaloes was one-tenth of that in cattle. The disease needed to be differentiated from anthrax and " bhoura ", a special disease of cattle peculiar to the province. In treatment, injections (intraven.) of antimony tartrate were employed with success.—C. DAVENPORT.

I. NICOLLE, P. (1936). Variation du taux réticulocytaire au cours de l'incubation dans l'infection expérimentale du lapin par *Trypanosoma equiperdum*. [**Variations in Reticulocyte Count During the Incubation Period in Experimental** *Tryp. equiperdum* **Infection of the Rabbit**].—*C. R. Soc. Biol Paris.* **122.** 1312-1315. [5 refs.]

II. POINDEXTER, H. A., & BENNETT, R. I. (1936). **Some Observations on the Nature of the Thermoprecipitation Reaction in** *Trypanosoma equiperdum* **Infection.**—*Amer. J. trop. Med.* **16.** 485-492. 1 table. [7 refs.]

III. EYRAUD, E., VELU, H., & ZOTTNER, G. (1936). Vers une police sanitaire nouvelle. L'éradication de la dourine basée sur la chimiothérapie et le contrôle sérologique. [**New Plan for the Eradication of Dourine, Based on Chemotherapy and Serologic Control**].—*Bull. Soc. Path. exot.* **29.** 202-210. [3 refs.]

I. In the course of daily haematological observations made on rabbits infected

with *Tryp. equiperdum*, N. noted a rise and fall in the erythrocyte count. This was shown on two or three occasions between the date of infection and the onset of the clinical symptoms. Reduction in the number of erythrocytes varied from 20 to 25% and was associated with a 50 to 100% increase in the number of reticulated cells in circulation.

II. A critical study of certain aspects of the thermoprecipitation test for trypanosomiasis. The work was undertaken as a further step in the development of an inexpensive and simple diagnostic test for use under field conditions in those cases in which parasites are absent from, or have never been found in, the peripheral blood. The investigations recorded cover the following ground :– the nature of the thermostable substance ; the nature of the reaction ; the body tissues or extracts giving the best reaction ; the laboratory animals producing the best extracts, and the highest titre of immune serum.

III. The plan for the control of dourine proposed by E. to the Office international des Epizooties was set in operation in Morocco [*V. B.* **4.** 720]. E., V. and Z. issued a questionnaire to the inspectors of the animal husbandry service of the territory, in order to ascertain whether the laboratory findings on which the plan is based are borne out in practice. Twenty replies were received and they are summarized and analysed in this article.

The substitution of the subcutaneous for the intravenous route for prophylactic dosage with " naganol " was not a complete success, several observers reporting local and general reactions of a serious nature. On the whole, the use of " novarsenobenzol " for curative purposes was favourably reported on. Although the new plan came in for a considerable measure of adverse criticism, the authors find no grounds for amendment except in a few minor details.—C. Davenport.

I. Ionescu-Braila, G., & Cernaianu, C. (1936). Les affections à hématozoaires endoglobulaires des animaux. [**Endocorpuscular Blood Parasites in Animals**].—*Bull. Off. internat. Epiz.* **12.** 276-343. Discussion pp. 588-608. 1 table. [Numerous refs.]

II. Cottier, H. (1936). Les affections à hématozoaires endoglobulaires en Afrique du Nord. [**Endocorpuscular Blood Parasites of Animals in North Africa**].—*Ibid.* 344-359. Discussion pp. 588-608. [6 refs.]

III. Markoff, A. A. (1936). Les infections dues aux parasites endoglobulaires non-pigmentés. [**Infections Caused by Unpigmented Endocorpuscular Parasites**].—*Ibid.* 360-396. Discussion pp. 588-608.

IV. Rastegaieff, E. F., Timofeeff, P. S., & Matschulsky, S. N. (1936). Zur Frage der endoglobulären Parasiten der Schafe und Ziegen und ihrer Ueberträger. [**Endoglobular Parasites of Sheep and Goats and their Vectors**].—*Berl. tierärztl. Wschr.* **52.** 584-585.

I. A review of the literature on the intracorpuscular haematozoa of animals. The classification of the piroplasms is that suggested by du Toit and modified by Mesnil. The identity of the parasites described in various countries is discussed, and the differentiation of species by cross-immunity tests is accepted as the most satisfactory method. The ticks transmitting the various species of parasite are enumerated and a brief description is given of their biology and the development cycle of the parasites in them.

In Rumania, the diseases are most prevalent in humid, marshy areas in the spring and autumn. In young animals they are very mild, and congenital infections with *Babesia equi* occur in foals. The mortality from *B. bigemina* infection is said to vary between 35 and 84·5%, and from *B. ovis* infections from 15 to 75%. The diagnoses of the diseases are briefly discussed under the headings of symptoms,

lesions and smear examinations. Immunity is also briefly discussed, and considered to depend upon latent infection and to persist while such infection exists.

Treatment is very fully discussed, and it is suggested that doses of from 0·1 to 0·2 g. per 100 kg. of trypan blue are sufficient for cattle infected with *B. bigemina*, and doses of from 0·5 to 0·6 g. for horses infected with *B. caballi*. Hexamethalinetetramine (" urotropine ") is said to be effective in the treatment of *B. bovis* and *B. argentina* in doses of 20 g. a day, and in the treatment of *B. equi* in doses of 40 g. a day.

" Ichthargan " given in doses of 1 to 1·5 g. (intraven.) is said to be effective for *B. bovis* infections, as also is " trypaflavine " in doses of 1 g. The latter drug is also useful in *B. canis* infection and in anaplasmosis. " Acaprin " is effective for all the piroplasms except *Th. parva*, being used as a 5% solution in doses of 2 c.c. for cattle, 1·2 c.c. for horses, 2 to 5 c.c. for sheep, 5 c.c. for pigs, all per 100 kg. and 1 c.c. per 20 kg. of a 5 : 1,000 solution for dogs.

Prevention is discussed under the headings of elimination of the virus carrier, and tick destruction by pasture rotation, cultivation or dipping. The methods of artificial immunization are also reviewed.

The authors recommended that all countries concerned should make a study of intracorpuscular parasites and ticks ; that each country should study the methods of prevention best suited to local conditions, particularly dipping materials and antipiroplasmic vaccination. A further study of drug action on the various species of organisms should be made.

II. C. gives a list of the intracorpuscular parasites encountered in North Africa and points out that, except for theileriasis, disease only occurs in imported animals. Even local cattle suffer from theileriasis but calves and animals of the zebu breed are not severely affected. Methods of controlling the piroplasm diseases are discussed. As regards tick destruction, it is stated that dips are too expensive for a poor country, that dipping needs skilled supervision, and that with the disappearance of ticks the immunity of the young stock is lost, so that the cattle may become liable to contract a more severe form of the diseases in adult life.

Immunization is recommended for control in North Africa. Animals are inoculated with both the babesia and anaplasms in the autumn, and with the theileria in the spring. The objection that vaccinated animals become the carriers of theileria is met by the claim that the " kouba " strain, used for immunization, is not transmissible by ticks. C. considers that with the methods of immunization and treatment available, the only problem is that of the imported cow, which is more susceptible and should be kept tick-free.

III. This article presents the problem as it occurs in Russia, and the measures being taken to combat piroplasmosis in that country. M. discusses classification and the differentiation of species, and adopts the classification of Yakimoff. He considers that cross-immunity tests have only a relative value, as strains of a single species may fail to produce immunity to each other. He points out that morphology may vary to some extent during the course of an attack of the disease, and considers that differentiation based on transmission by different vectors should not be considered specific. It is laid down that a species should be considered valid if it is specific for a definite host, endowed with definite morphological characters, and in addition possesses special characters such as the power of immunization, the production of a disease with definite symptoms, reaction to specific treatment and specific epizootological properties.

The geographical distribution and the methods of transmission of the various Russian species of piroplasm are detailed, and it is pointed out that, in certain

areas, twice-yearly infection occurs, so that all the local animals become carriers. Other areas are unsuitable for ticks and, in certain years, the ticks may disappear entirely and animals grow up susceptible until fresh tick infestation occurs. In other areas, ticks may be present, but there may be no infected animals from which they can acquire infection. Treatment and immunization are discussed, the latter not having given successful results as regards theileria infections. Preventive treatment, administered at the start of the tick season, has given fairly good results, and dipping has been adopted in many areas. At present tick eradication, by improvement of grazing and rotation of pastures, is being undertaken on a large scale, which, it is claimed, could only be accomplished on communal farms.

In the discussion which followed, BISANTI pointed out that, while North Africa appeared to be relying on immunization, all other countries favoured tick destruction. RACHAD said that in Egypt, *B. bigemina* sometimes caused serious losses. Dipping was carried out by the Government at the request of the owner, and it was hoped to establish dips in all villages. " Trypaflavine " had not given good results either in the treatment of *B. bigemina* infection or of ovine piroplasmosis.

IV. This article records the detection of babesia infection in sheep in the Leningrad area. Two four-month-old lambs were infected, and showed a slight rise of temperature and debility, but no haemoglobinuria. The only ticks in the area are *Ixodes ricinus* and *I. persulcatus*. Anaplasms were also detected in a goat at Leningrad and must also be presumed to be transmitted by the same ticks. As cattle round Leningrad do not exhibit anaplasms, it is considered that *Anaplasma ovis*, which is pathogenic to goats and sheep must be a species distinct from the anaplasms of cattle.

Infection with *A. ovis* and *Th. recondita* was found to be enzootic in the Ukraine, but the classical transmitter, *R. bursa*, is not present. The predominant tick in this area is *Dermacentor silvarum*. Attention is also drawn to the importance of *Ornithodorus lahorensis*, which has been shown to be capable of transmitting *A. ovis* and *Th. recondita*, and is associated with tick paralysis in sheep. Observations on the bionomics of this species indicated that it developed through four moults in the nymphal stage.—U. F. RICHARDSON.

SHORTT, H. E. (1936). **Life-History and Morphology of** *Babesia canis* **in the Dog-Tick** *Rhipicephalus sanguineus*.—*Indian J. med. Res.* **23.** 885-920. 2 text figs., 44 figs. on 9 plates. [17 refs.]

S. describes the development of *Babesia canis*, as seen by tracing the parasites after the ingestion of infected blood by nymphs of *R. sanguineus* to the appearance of the infective stages in the salivary glands of the adults. The description differs from that of REGENDANZ and REICHENOW in that the early developmental stages occur in certain phagocytic cells of the body cavity, and not in the cells of the tick's intestine. He also describes a stage of concentration of the parasites in the muscles and muscle sheaths.

The technique described consisted in the examination of sections from ticks doubly embedded in celloidin and paraffin. The ventral surface of the tick was fixed on a paraffin block, a retaining wall of plasticine made round the tick, and the chamber flooded with fixative or saline. The chitin round the lateral margins of the tick was cut and lifted off with needles, the tick being then transferred to fixative (Bles, Carnoy or Bouin). The specimen was dehydrated in alcohol, transferred to clove oil, and then to a solution of celloidin in clove oil in which it remained for a minimum of four days. It was then transferred to a paraffin-coated cover-slip, which was floated, upside down, on chloroform till the button of celloidin

containing the tick was detached. The celloidin-embedded tick was then transferred to fresh chloroform to clear and harden, and was embedded in paraffin without drying. For larvae, a small pocket was made in a rectangular piece of amyloid liver, and after the insertion of about 100 larvae the liver was immersed in fixative, and the mouth of the pocket closed with a plug of albumen.

A common procedure was to stain half the sections from a tick with Giemsa's stain and the rest with iron haematoxylin. To make permanent preparations from giemsa-stained sections they were suspended in xylol until the cover-slip fell off, then suspended upside down in methyl alcohol until decolorized, then transferred to iron-ammonia alum, and finally restained with iron haematoxylin.

A description is given of the parasites as they appeared at various intervals in the nymphal ticks, and from these S. reconstructs the development cycle of the parasite.

In blood ingested by a tick, parasites unaltered in appearance may still be seen in the corpuscles or lying free, but there appears to be a great destruction of parasites ; free forms may be seen clumped into groups. The first signs of development are detected in nymphs four to five days after they drop from the dog, when the parasite is seen as a globular body with a single small nucleus, and is contained in a large phagocytic cell in the epidermal layer under the chitinous covering. S. calls this stage the " pseudo-zygote ". The nucleus divides and redivides until the parasite becomes multinucleate. The cytoplasm condenses round each chromatin mass to form a globular body, and the " pseudo-zygote " is converted into a clump of such bodies within the envelope of the phagocytic cell. This structure, which resembles a cyst, and is designated the " pseudocyst ", is fully developed about seven days after the tick has left the dog. About eight to ten days after the nymph has left the host the globular forms of the " pseudocyst ", designated " primary sporoblasts " develop into club-shaped bodies, and about three days later they leave the " pseudocyst " and migrate to the muscles and the muscle sheaths, where they divide to become " secondary sporoblasts ". By this time the nymph has become an adult. No further changes occur until the tick commences to feed, when the parasites migrate to the salivary glands in which they become well established within two or three days. In the salivary glands intense multiplication takes place, infected cells becoming packed with round or polyhedral forms, the infective sporozoites.

It is claimed that during the investigations it was shown that two methods of infection occurred ; a hereditary method in which the adult tick acquired infection which was transmitted by the larvae or nymphs, and a stage-to-stage method in which infection was transmitted between larval and nymphal stages, or nymphal and adult stages.—U. F. Richardson.

I. Adler, S., & Ellenbogen, V. (1936). **Remarks on the Relationship between the Palestinian and Algerian Pathogenic Theileria.**—*Arch. Inst. Pasteur Algér.* **14.** 66-68. [2 refs.] [In English].

II. Cordier, G., Menager, J., & Delorme, A. (1936). Étude de la souche Algérienne " Kouba " de *Theileria dispar*. Son importance dans la prémunition antitheilerique bovine. [**The " Kouba " Strain of** *Th. dispar* **of Algeria. Its Importance in Immunization against Theileriasis**].—*Bull. Soc. Path. exot.* **29.** 313-327. [3 refs.]

III. Sergent, Ed., Donatien, A., Parrot, L., & Lestoquard, F. (1936). Étude morphologique du cycle évolutif de *Theileria dispar* chez le boeuf et chez la tique. [**Life Cycle of** *Th. dispar* **in Cattle and in Ticks**].—*Ann. Inst. Pasteur.* **57.** 30-55. 6 text figs. [Numerous refs.]

I. A. and E. argue that the identity of the Palestinian and the Algerian *Theileria* is not proved by the experiments in Algeria [*V. B.* **6.** 862.], as the number of calves which died after an infection with Algerian virus, followed by inoculation with Palestinian virus, was higher than the mortality from the Palestinian virus alone in younger calves. Also, the Algerian virus used to test the immunity produced by the Palestinian virus was not sufficiently virulent to produce a mortality in untreated animals. In Palestine, although mortality from the Palestinian virus was reduced by previous inoculation with a mild Algerian strain, four calves which had recovered from the Palestinian infection died after inoculation with a virulent Algerian strain.

II. The authors, investigating the properties of the "Kouba" strain of *Th. dispar*, obtained from the Pasteur Institute, Algiers, found that the incubation period averaged from 14 to 18 days, but that blood taken at the commencement of the reaction was not always infective. To overcome this difficulty in the maintenance of the virus, blood was collected daily from the first day of fever until the reaction subsided and the mixed specimens were inoculated into a susceptible animal. Blood could be relied on to remain infective for four days. Reactions consisted of a rise of temperature lasting from two to five days with the appearance of schizogonic forms in the reticulo-endothelial tissue and in the blood, but no disturbance of health and no appearance of intracorpuscular forms of the parasite. In some cases no febrile reaction occurred, and, in some, the animals proved to be immune, whilst others reacted to a second inoculation. In the field, temperature reactions occur in about 25% of cases only, but it is concluded that the majority of the animals acquired immunity. It is reported that 1·5% of the inoculated animals died, while in the same area, the loss in the uninoculated animals was 9%.

Animals of the zebu breed proved less susceptible than European breeds or cross-bred animals. The blood of a reacting animal loses infectiveness at the end of the febrile reaction, and attempts to resuscitate infectivity with adrenalin hydrochlorate were unsuccessful.

III. This article gives an account of the life-cycle of *Th. dispar* as observed in Algeria. On inoculation into a susceptible bovine, an incubation period of about 14 days is followed by an asexual multiplication of the parasites in the reticulo-endothelial system, causing an acute febrile reaction lasting about six days. These schizogony forms then gain access to the blood and may be seen free in it or in reticulo-endothelial phagocytes.

At the end of the acute attack the gamonts produce the intracorpuscular forms (gametocytes) which are usually in the form of rings, but are sometimes oval or elliptical. These forms persist in the blood for some time but do not cause disease. Transmission by blood inoculation is due to circulating schizogonic elements, and in some strains no production of gametocytes occurs. In the tick, *Hyalomma mauritanicum*, the following stages were detected :– an agglomeration of gametocytic forms in the intestine followed by binary division of the nuclei, but no evidence of sexual conjugation ; an irregular-shaped body with an areolar structure and devoid of chromatin, considered to be a zygote which encysts in the lumen of the intestine over the winter, whilst the nymphal ticks are hibernating off the host, but emerges from the cyst about a day before the ticks moult in the spring ; sporonts appearing in the salivary glands of the ticks after attachment to a new host, and giving rise to sporozoites which again exhibit chromatin, and appear as early as the third day after attachment.

That these bodies represent the stages of development of *Th. dispar* is deduced from the fact that *H. mauritanicum* does not transmit any other piroplasm, and that they were encountered in the majority of ticks fed on infected cattle, but

not in those fed on healthy cattle. It was noted that larvae might become infected and that, if moulting was delayed, the parasite might develop so that the nymphs became infective.

Experiments are also recorded showing the failure of the parasite to develop in ticks after the strain had been transmitted mechanically by blood inoculation; one experiment is recorded indicating that ticks do not become infective till 60 hours after attachment to a new host.—U. F. RICHARDSON.

METTAM, R. W. M., & CARMICHAEL, J. (1936). **Turning Sickness, a Protozoan Encephalitis of Cattle in Uganda. Its Relationship with East Coast Fever.** —*Parasitology*. **28.** 254-283. 6 figs. on 1 plate. [Numerous refs.]

Under the name of "turning sickness" M. and C. describe a disease of cattle in Uganda, characterized by nervous symptoms, petechial haemorrhages of the brain and meninges, and lymphocytic emboli in the cerebral vessels which contain bodies similar in structure to the plasma bodies of the genus *Theileria*. The article is based on the examination of 24 animals suffering from the disease, one case being encountered in Kenya Colony and the remainder in Uganda. The disease is said to be wide-spread in Uganda, and to affect cattle of both sexes and all breeds, being most common in young stock between six months and two years old. 63% of the animals under observation were known to have suffered from East Coast fever a few months before developing symptoms of "turning sickness", and the majority of the remaining animals had been raised in areas in which East Coast fever is enzootic. No cases of "turning sickness" have been encountered in one area which is free from East Coast fever.

The disease may be acute or chronic. In the acute type the animals develop violent nervous symptoms, turning or spinning in one direction until dizzy, when they collapse. In the collapsed stage twitching of muscles and profuse salivation occur. When consciousness returns the animal rises to its feet and may nibble at the grass; there is no fever. In the less acute cases, the turning movements are not so rapid and the depression is not so great; the animal may stand with its head pushed against a tree. In chronic cases the animal exhibits muscular incoordination and blindness. The course of the disease varied from two days to six months, but all cases terminated fatally.

In acute cases the vessels of the brain are congested, there are blood extravasations into the meninges, and the choroid plexuses of the ventricles are swollen and deep red in colour. In chronic cases necrosis, atrophy, fibrosis and cavity formation are found, the lesions being most frequently observed in the white matter of the cerebral hemispheres. A local or diffuse, pale-yellow discoloration was a constant feature of chronic cases, and small cavities, containing a citron-coloured fluid, were found in all parts of the hemispheres. The spleen, lymphatic system, liver and lungs showed no constant or noteworthy feature, but ulcers of the abomasum were encountered in three animals, and kidney lesions, resembling those of East Coast fever, were encountered in four animals. Koch's bodies were present in large numbers in films made from the cerebral haemorrhages, both the agamogonous and gamogonous forms being encountered. The bodies averaged from 5 to 10μ, but huge agamonts were seen occasionally. In the more chronic cases, in which the haemorrhages had been absorbed, Koch's bodies could no longer be found. It was unusual to find *Theileria* in any numbers in the blood. In three animals blue bodies were found in large numbers in the peripheral blood but, except in one case, it required long and careful search to discover these bodies in the spleen, and in many cases they could not be demonstrated at all.

Histologically, the predominant lesion in the brain is a blocking of the smaller

arteries or arterioles by dense masses of lymphocytes. Attempts to transmit the disease, by inoculation of brain tissue and blood by various routes to animals either immune or susceptible to East Coast fever, were all unsuccessful, as were attempts to transmit it by means of ticks or by the inoculation of emulsions of ticks. A lengthy discussion is given, in which it is pointed out that nervous symptoms have been recorded in association with infections by *Th. annulata* and *Th. dispar*, but there is no evidence that either of these piroplasms exists in Uganda. It is also pointed out that, as far as experimental evidence goes, the form of East Coast fever in Uganda is always acute, and that no relapses have ever been seen at the Entebbe laboratory, although some district officers have reported that they occasionally occur. Attempts to produce relapses have been negative and it is concluded that latent infections, if they exist, must be extremely rare. [No details are given as to the number of transmission experiments, but if the bodies described are schizonts, the failure to transmit the disease appears to be remarkable].
—U. F. RICHARDSON.

BHATIA, B. L. (1936). **Is *Piroplasma taylori* Sarwar a Valid New Species?**—*Indian J. vet. Sci.* **6.** 151-154. [9 refs.]

B. discusses the description of a piroplasm of the goat for which SARWAR proposed the name *Piroplasma taylori* [*V. B.* **6.** 224]. He suggests that the forms described by SARWAR as extracellular bodies showing multiple division are Koch's blue bodies, and that the parasite was in fact *Theileria hirci*.—U. F. RICHARDSON.

TOPACIO, T. (1936). **Immunization against Anaplasmosis and Piroplasmosis.**—*Philipp. J. anim. Indust.* **3.** 169-179. 3 tables. [7 refs.]

Batanga and Ayrshire calves were infected in various ways with the blood of Philippine cattle, carriers of piroplasms and anaplasms. As it was found that blood containing both parasites caused a high mortality, an attempt was made to obtain cattle carrying a pure infection of each parasite. Finally a pure piroplasm infection was found in an Ayrshire bull and a pure anaplasm infection in local cattle.

Calves were successfully immunized by 2 to 3 c.c. of piroplasm-infected blood (subcut. inoc.), followed one month later by 3 to 25 c.c. of anaplasm-infected blood. The calves all reacted, and thereafter remained well when exposed for months to natural infection.—J. E.

I. MORRIS, H., MARTIN, J. A., & OGLESBY, W. T. (1935). **An Attempt to Transmit Anaplasmosis by Biting Flies.**—*J. Amer. vet. med. Ass.* **89.** 169-175. [13 refs.]

II. HERMS, W. B., & HOWELL, D. E. (1936). **The Western Dog Tick, *Dermacentor occidentalis* Neum., a Vector of Bovine Anaplasmosis in California.**—*J. Parasit.* **22.** 283-288. [9 refs.]

I. Three short experiments were conducted in Louisiana by the authors. Fly-proof quarters in the animal pathology building were acquired and three animals were used in each of three experiments, using as vectors *Tabanus atratus*, *Haemotobia irritans* and *Tabanus fuscicostatus* respectively. All nine animals were kept under observation for 80 to 100 days and failed to develop the disease, although one preliminary test with *T. atratus* proved positive in 25 days. Later, all nine animals were proved to be susceptible. The literature on the subject is reviewed.

II. Three experimental cases of hereditary transmission of bovine anaplasmosis by the western dog tick, *Dermacentor occidentalis*, and two cases of non-

hereditary transmission by *D. albipictus* are described. In two experiments *D. occidentalis* larvae, hatched out from eggs of ticks fed on a clinically affected cow, were used. In the third case, nymphs from the above larvae were found to transmit the disease. The life history of *D. occidentalis* is discussed. It is chiefly found in Oregon and in California and should not be confused with the Rocky Mountain spotted fever tick, *D. andersoni*, or with the common dog tick, *D. variabilis*. Details are given of the technique used.—R. FISHER.

CARPANO. (1936). Découverte de corps intraleucocytaires chez les poulets d'Égypte et considérations sur leur nature. [**Intraleucocytic Bodies Found in Fowls in Egypt**].—*Ann. Parasit. hum. comp.* **14.** 380-384. 4 figs. on 1 plate. [8 refs.]

C. described intracorpuscular bodies found in the cytoplasm of polynuclear leucocytes in a fowl in Egypt which died after showing symptoms of anorexia and paralysis. Cultures and subinoculation of blood gave negative results, but the blood smears showed a heavy spirochaete infection and a large increase of polymorphonuclear leucocytes, some of which were vacuolated. In the cytoplasm of normal or vacuolated leucocytes, coccoid bodies varying in size between 0·5 and 1·5μ were detected ; as many as 20 might be found in one cell, and some gave the appearance of binary fission. The bodies stained reddish violet with Giemsa's stain.

The various records of the detection of inclusion bodies in the leucocytes of fowls are discussed, and C. suggests that these inclusions may represent a stage of a spirochaete or that they may be a type of protozoa.—U. F. RICHARDSON.

KUPPUSAMY, A. R. (1936). **Leucocytozoa and Microfilariae of Fowls and Haemoproteus columbae of Pigeons in Province Wellesley.**—*Indian vet. J.* **13.** 25-35. 7 plates, 1 table. [3 refs.]

K. first observed leucocytozoa and microfilariae in the blood of a White Leghorn fowl sent to him for examination. He subsequently examined the blood of 237 fowls at a local poultry market and found the majority to be infected with leucocytozoa, and some with microfilariae ; there were also some double infections. The symptoms given included elevated temperature, comb cyanosis, and diarrhoea. Some fowls were found free and remained so. Some infected with leucocytozoa thrived, no increase occurring. Two healthy fowls could not be infected by injections of infected blood, lung or spleen tissues. K. concludes that these diseases are common and suggests that they are transmitted by *Culex pipiens*. Thirty-four pigeons were examined and all were found to be infected with *H. columbae*, but none showed signs of illness. The staining technique and dimensions of the parasites are also given.—R. FISHER.

SCHLOSSBERGER, H., & POHLMANN, R. (1936). Serologische Untersuchungen über Stuttgarter Hundeseuche. [**Serological Tests for Spirochaetal Reaction in Stuttgart Disease**].—*Zlb. Bakt. I. (Orig.).* **136.** 182-194. 4 tables. [Numerous refs.]

S. and P. discuss the theory that Stuttgart disease is caused by a spirochaete, pointing out that LUCET [(1910). *C. R. Acad. Sci., Paris.* **151.** 260.] recorded the presence of spirochaetes in affected dogs and that the finding of the same organisms in other conditions discredited the theory. WIRTH [*V. B.* **5.** 742.] recently revived the question.

S. and P. carried out agglutination tests with the sera of 33 affected dogs, using antigens prepared from 23 strains of leptospira isolated from rats, dogs and

man, both *L. icterohaemorrhagiae* and *L. canicola* being represented, there probably being less than half a dozen different species altogether. In most cases each dog serum was tested with an average of ten antigens and each dog serum reacted with at least one antigen ; some reacted with as many as seven antigens and agglutinated both leptospiral species.

Two monovalent immune sera against strains of *L. icterohaemorrhagiae* and *L. canicola* respectively were prepared in rabbits and tested with the above 23 antigens, some of which were agglutinated at various titres.

S. and P. consider that the suspension used for tests of leptospiral infection should be prepared from a mixture of strains.

Two leptospira strains isolated from 2 of the 33 dogs were found to be intermediate in serological behaviour between Schüffner's established species – *icterohaemorrhagiae* and *canicola*.—J. E.

DISEASES CAUSED BY VIRUSES.

López, C., Lajo, T. V., & López, F. (1936). Essais de traitement de la péripneumonie bovine avec un sérum anti-péripneumonique. [**Antiserum Treatment of Bovine Contagious Pleuro-Pneumonia**].—*Bull. Off. internat. Epiz.* **12.** 475-481. 2 tables.

The authors refer to the difficulties encountered in attempts to develop a vaccine for the control of cont. bov. pl.-pneumonia. They suggest the use of an antiserum.

This article gives details of special methods which they adopted for the hyperimmunization of two bullocks, as a result of which they obtained a potent antiserum. Particulars are furnished of the value of this serum when it was employed on certain affected animals in Spain. In all, ten animals received injections and eight of these were said to be cured. [No evidence is given to support this claim.—Ed.]. No serious reaction occurred when the serum was injected (subcut.) but considerable disturbance followed intravenous administration.—C. Davenport.

I. Dale, H. H. (1935). **Viruses and Heterogenesis. An Old Problem in a New Form. [Huxley Memorial Lecture].** pp. 24. 1 table. London : Macmillan & Co., Ltd. [8vo] [1s.]

II. —. (1936). [Papers by Findlay, G. M., & by Galloway, I. A., with General Discussion]. **Discussion on the Routes of Infection and Paths of Transmission of Viruses.**—*Proc. R. Soc. Med.* **29.** 563-578. [Numerous refs.]

III. Twort, F. W. (1936). **Further Investigations on the Nature of Ultra-Microscopic Viruses and Their Cultivation.**—*J. Hyg., Camb.* **36.** 204-235. [16 refs.]

I. An extremely interesting address on the nature of the viruses. The various theories regarding the composition, modes of propagation, size, etc., of these entities, and the difficulties confronting the experimentalist are discussed. The paper should be consulted in the original, on account of the general nature of the matter.

II. These contributions to the Section of Comparative Medicine provide a very valuable résumé of the present position regarding the transmission of viruses. The article does not lend itself to abstraction and should be consulted in the original by those interested in the subject.

F., who opened the discussion, suggested that the life histories of the viruses

might be divided into seven stages :– (1) transmission to new vertebrate hosts ; (2) entry into new hosts ; (3) spread through the tissues of the host ; (4) localization in selected cells ; (5) action on parasitized cells ; (6) excretion from the host, and (7) passage through arthropod hosts (certain viruses). Each of these stages is described in detail.

A comprehensive list is given of the virus diseases of animals transmitted by insect bites, and of the possible vectors.

G. opened his remarks by a consideration of the affinity of different viruses to various tissues. He pointed out that, while the elective tropism of certain viruses was quite clear-cut in some cases, in others, care had to be exercised in drawing conclusions, particularly when a virus possessed latent powers to infect several types of cell. He then dealt more particularly with neurotropic viruses. These he groups into three classes. Group 1 contains the strict neurotropes, *e.g.* rabies, Borna disease, etc., which travel by way of some component part of the nerve trunks. Group 2 is composed of neurotropic viruses which also attack other tissues, *e.g.* Aujeszky's disease, herpes, etc. In group 3 are placed such entities as yellow fever, louping-ill, equine encephalomyelitis and, possibly, African horse sickness, which are transmitted either by arthropods or by insects. G. described in greater detail the mechanism of infection in the latter class.

Wilson Smith drew attention to the restriction of the virus to the respiratory tract infection in experimental influenza, and its failure to spread from the lungs to other parts of the body. He discussed the bearing of these observations on immunity.

Weston Hurst made the interesting observation that the virus of equine encephalomyelitis, which is neurotropic, does not pass directly to the brain *via* the nervous system. It first invades the blood stream, then appears in the nasal secretion, and is transmitted from the nasal mucous membrane through the nerve channels to the brain.

Bedson referred to the importance of the faeces as a means of transmitting psittacosis virus.

III. T. holds the view that viruses are not extremely minute bacteria nor stages in the bacterial life-cycle. He suggests that they may be some precellular form of life which is capable of multiplying apart from the complete cell.

A description is given of efforts made to obtain cultures of these entities on special media prepared from agar, to which was added rain water, various natural muds, extracts of ferns, etc. The inocula were filtrates of animal or vegetable material, which were presumed to contain different forms of primitive life. The cultures were exposed to various external influences such as sunlight, rays from quartz prisms and so on.

The object of the experiments was to discover suitable conditions for the growth of viruses in artificial media containing no living matter. Numerous minute organisms with peculiar requirements were isolated from some of the filtrates, while the existence of certain " granules " in the cultures was also established.—R. E. Glover.

I. Jacotot, H. (1936). Y a-t-il quelque avantage à administrer en plusieurs fois le vaccin contre la peste bovine ? **[Value of Single or Multiple Dose Vaccination against Rinderpest]**.—*Bull. Soc. Path. exot.* **29.** 111-116.

II. Rahim-ud-din, M. (1936). **Rinderpest Immunisation, at Livestock Research Station, Hosur Cattle Farm.**—*Indian vet. J.* **13.** 45-47. 1 table.

III. Rahim-ud-din, M. (1936). **Experiment with Bull Virus (Rinderpest) on Animals Protected with Goat Virus.**—*Ibid.* 48-49.

IV. D'Costa, J. (1936). **Rinderpest – its Period of Incubation.**—*Ibid.* **12.** 306-310.

V. D'Costa, J. (1935). **Studies on Rinderpest Virus – its Infectivity and Viability.**—*Ibid.* 109-113 and 202-205.

VI. Jacotot, H. (1936). Association expérimentale de la peste bovine et la vaccine. [**Experimental Association of Rinderpest and Vaccinia**].—*Bull. Soc. Path. exot.* **29.** 707-709.

I. J. carried out a series of experiments to ascertain whether any advantage accrues from the administration of anti-rinderpest vaccine in multiple doses. Records of the inoculation experiments are given. From the results obtained he concludes that the immunity derived through the inoculation of vaccine in two doses at an interval of three weeks is not more durable than that conferred by a single injection. The double procedure does, however, result in a stronger degree of immunity during the weeks immediately following vaccination.

II. R. records certain experiences connected with rinderpest immunization work as carried out at a government cattle farm in India. The article deals only with the immediate reactions to virus inoculation. Two methods of active immunization were adopted, namely, the ordinary serum-simultaneous process in which use is made of bull virus, and the goat virus method. In both cases 50% of the inoculated animals showed a clinical reaction, which was milder in the case of those receiving the goat virus. No mortality resulted in connexion with either procedure.

III. Experiments were carried out at a government cattle farm in India to ascertain the effect of the injection of rinderpest bull virus on cattle which had previously been protected by goat virus inoculation. No reaction was obtained in any of the animals tested. R. concludes that the immunity conferred by goat virus is of a similar nature to that set up by bull virus.

IV. This is a general discourse on the factors influencing the rinderpest incubation period, the following being considered :– breed, species, route of infection, degree of virulence of the infective material, infection naturally acquired as compared with induced, potency of the virus and the quantity absorbed, the concentration of virus, natural resistance of the animal, etc. An explanation is offered for the longer period commonly met with in naturally infected cases.

V. This is a general review of the power of infectivity and viability of the rinderpest virus. Methods of infection under natural conditions are first considered, particularly air dissemination of the virus. The infectivity of the virus contained in the body-fluids, tissues, exudates and excretions is then dealt with. The second part of the paper is devoted to the power of survival of the virus on exposure to various influences. There is a note on the part played by the affected animal itself in the maintenance of virus at a high degree of infectivity. The question of the possibility of different strains existing is then considered. From the foregoing a series of conclusions are drawn relative to the procedure for the control of the disease.

The paper contains no new material but constitutes an excellent review of the subject.

VI. This is a study of dual infection by rinderpest and vaccinia. Three experiments are described in which the viruses of these two diseases were inoculated subcutaneously into susceptible calves and buffaloes. Concurrent infections resulted, and the pustular exudate of the vaccinial lesions proved to be rich in both viruses.—C. Davenport.

SOKOLA, D. (1935). Klinički i patološko-anatomski nalaz kod infekciozno anemičnih konja. [**Clinical and Pathological Findings in Horses Suffering from Infectious Anaemia**].—*Jugoslov. vet. Glasn.* **15.** 211-216. [4 refs.]

KALIKIN, B. (1935). Klinički i patološko-anatomski prilozi poznavanju infekciozne anemije konja. [**Clinical Pathology of Equine Infectious Anaemia**]. —*Ibid.* 531-566. 4 tables. [14 refs.]

HUPBAUER, A., & MALENŠEK, S. (1935). Infekciozna anemija. [**Equine Infectious Anaemia**].—*Ibid.* 623-629. [15 refs.]

These articles deal with the symptoms, diagnosis and differential diagnosis of E.I.A. [*V. B.* **5.** 555]. Although four types of syndrome have been recognized, it is sufficient in practice to differentiate them into acute and chronic. The acute form must be differentiated from anthrax, influenza, purpura, myohaemoglobinaemia and redwater. There are a number of clinical aids to diagnosis, but all depend on the secondary manifestations and can only be used for a tentative diagnosis. The only certain method is the inoculation of young, healthy horses with blood. The appearance of the body organs after death also gives contributory evidence.

Prevention is best based on hygienic measures. It is important to ensure that serum-producing horses are not affected with E.I.A.—B. OSWALD (SKOPLJE).

I. REMLINGER, P., & BAILLY, J. (1936). Inoculabilité du virus de l'encéphalomyélite argentine des équidés par la voie du conduit auditif externe. [**Transmission of Virus of Argentine Equine Encephalomyelitis by the External Auditory Meatus**].—*C. R. Soc. Biol. Paris.* **121.** 933-934. [2 refs.]

II. REMLINGER, P., & BAILLY, J. (1936). Contribution à l'étude de la nature du virus de l'encéphalomyélite argentine des equidés. [**Nature of the Virus of Equine Encephalomyelitis**].—*Ibid.* 1265-1266.

III. MADSEN, D. E., KNOWLTON, G. F., & ROWE, J. A. (1936). **Further Studies on Transmission of Equine Encephalomyelitis by Mosquitoes.**—*J. Amer. vet. med. Ass.* **89.** 187-196. 5 tables. [7 refs.]

IV. DERRICK, J. D. (1936). **Equine Encephalomyelitis.**—*Vet. Bull. U.S. Army.* **30.** 174-192. 5 charts. [Numerous refs.]

V. COX, H. R., & OLITSKY, P. K. (1936). **Active Immunization of Guinea Pigs with the Virus of Equine Encephalomyelitis. III. Quantitative Studies of Serum Antiviral Bodies in Animals Immunized with Active and Inactive Virus. IV. Effect of Immune Serum on Antigenicity of Active and Inactive Virus.**—*J. exp. Med.* **64.** 217-222 and 223-232. 4 tables. [Numerous refs.] [See also *V. B.* **6.** 865].

I. The virus of equine encephalomyelitis was transmitted to rabbits and g. pigs by instillation into the external auditory meatus. The incubation period was from 9 to 26 days.

II. This article contains general observations on the filtrability and diffusion of the virus of equine encephalomyelitis, including a discussion on the sedimentation of the virus by centrifugation.

III. Earlier work on the transmission of equine encephalomyelitis by mosquitoes has been abstracted [*V. B.* **4.** 107; **5.** 500; **6.** 331 and 420]. In the experiments described in this paper, two types of mosquito, *viz*, *Aedes nigromaculis* and *A. dorsalis*, were fed on infected g. pigs at various periods after the intracerebral injection of the virus. They were then allowed to feed on normal g. pigs at regular intervals. In the case of *A. nigromaculis*, the period of transmission varied from four to ten days, while with *A. dorsalis* it was between the 9th and 19th days. It was not possible to correlate the infection of the mosquitoes with the

period at which the febrile crisis was at its maximum : in fact, some evidence was obtained that infectivity for the insect was at its height during the prefebrile stage.

Attempts to transmit the virus to six horses by means of mosquitoes were unsuccessful, but it is not certain that the animals selected were fully susceptible at the commencement of the experiment.

IV. Experiments on the infectivity of the blood showed that serial intravenous injections from horse to horse during the early febrile stages always induced encephalomyelitis, but that the body fluids were invariably negative after the temperature had fallen. No evidence of plurality of viruses was found although eastern strains were invariably more virulent than western types.

Details are given of the method of obtaining stocks of virus from the horse, the clinical symptoms of the disease, methods of transmission, the nature and significance of secondary organisms, and *post-mortem* findings.

Several immunity experiments were undertaken in which protected horses were tested with a standard suspension of virulent brain stored in buffered glycerin solution for at least 30 days. Two processes were examined :– (a) a modification of the Dunkin-Laidlaw method for immunization against distemper, using a vaccine composed of brain suspension attenuated by formol, followed by standard virus ; three horses were immunized and resisted the inoculation of the virus ; (b) a serum-simultaneous method comprising a hyperimmune equine serum and a standard brain suspension ; two horses were immunized and were completely resistant to subsequent doses of the virus.

V. In a previous communication [*V. B.* **6.** 865.] it was reported that g. pigs immunized with sublethal doses of active or formalinized virus were protected against small infective doses. In this article it is shown that sera from animals immunized in this manner contain no significant humoral antibodies. Sera from animals which were solidly immune, as well as hyperimmune sera, however, protected against 1,000 or more intracerebral doses, provided that the quantity of test virus which was given was not too great.

Further experiments indicated that hyperimmune sera in suitable dilutions, injected shortly before either living or formalinized virus suspensions, prevented the latter from exerting their immunizing effect.—R. E. Glover.

Green, R. G., Green, B. B., Carlson, W. E., & Shillinger, J. E. (1936). **Epizoötic Fox Encephalitis. VIII. The Occurrence of the Virus in the Upper Respiratory Tract in Natural and Experimental Infections.**—*Amer. J. Hyg.* **24.** 57-70. 3 figs. [8 refs.] [See also *V. B.* **6.** 129].

A series of experiments in susceptible foxes showed that fox encephalitis virus could be recovered with comparative ease from nasal washings of infected animals. This observation suggested that infection of the upper respiratory tract might be of importance in the natural spread of the disease. Accordingly, a group of 15 normal animals was placed in close proximity with batches of experimentally infected foxes. Two deaths were recorded, of which only one was definitely due to the virus. The nasal cavities of the remainder were washed out and the pooled secretions used to reinfect the survivors and to inoculate fresh, susceptible animals. Two further deaths from encephalitis occurred in the former group, while all the controls succumbed.

Following serum-virus inoculations, the upper respiratory tract was free from the virus except in the case of animals which showed delayed reactions to the inoculum.

Specific inclusion bodies were found in the epithelial cells of the mucous membrane of the naso-pharynx ; while the occurrence of a superficial ulceration of the tonsil is described.—R. E. Glover.

I. Nicolau, S., & Kopciowska, L. (1935). Sur la transformation du virus rabique fixe en virus des rues. [**Transformation of Fixed Rabies Virus into Street Virus**].—*C. R. Soc. Biol. Paris.* **119.** 140-143. 1 fig. [7 refs.]

II. Kopciowska, L. (1935). Septinévrite à virus rabique fixe " ramené en arrière " (transformé apparement en virus des rues). [**Infection of Nerves by Fixed Virus apparently Transformed into Street Virus**].—*Ibid.* 143-146. 1 fig. [10 refs.]

III. Kopciowska, L. (1935). Sur le virus rabique fixe pastorien " ramené en arrière " (transformé apparement en virus des rues après passages répétés dans le systéme nerveux périphérique du lapin). [**Apparent Transformation of a Pasteur Fixed Virus into a Street Virus by Repeated Passage in the Peripheral Nerves of Rabbits**].—*Ibid.* 405-408. 1 fig. [4 refs.]

IV. Nicolau, S., & Kopciowska, L. (1936). Passage en série, de nerf à nerf, chez le lapin, du virus rabique fixe ; récupération de la " Négrigenèse." [**Serial Neural Passage of Fixed Rabies Virus in the Rabbit with Restoration of Negri Bodies**].—*Ibid.* **122.** 280-282. 1 fig. [6 refs.]

V. Levaditi, C., & Schoen, R. (1936). Négrigenèse cornéenne et régénérescence épithéliale. [**Formation of Negri Bodies in Regenerated Corneal Epithelium**].—*Ibid.* 616-618. [6 refs.]

VI. Reichel, J., & Schneider, J. E. (1936). **Response to Rabies Vaccine Prophylaxis as Shown by Protection Tests.**—*Amer. J. publ. Hlth.* **26.** 789-792. 5 tables. [1 ref.]

I. N. and K. previously noted the effect of intraneural inoculation in transforming a strain of fixed virus into one producing Negri bodies [*V. B.* **4.** 730]. In this article they report a similar finding with a second strain.

II. In rabbits inoculated intracerebrally with street virus, the peripheral nerves are invariably affected whereas, in those receiving fixed virus, only a proportion show the presence of the virus in these sites. It is now shown that a fixed virus, which has been passaged through the sciatic nerve several times, behaves like a street virus in that it invariably infects the peripheral nerves after intracerebral inoculation.

III. The modified virus produced by the method described in I [above] is pathogenic for the dog, in which it behaves like a street virus in provoking large and numerous Negri bodies. It still retains, however, the character of a fixed virus when injected intradermally or subcutaneously into rabbits, since the animals are invariably unaffected.

IV. Similar results to those mentioned in I were obtained with the strain " Babès L ", a fixed virus from Bucharest. In this case, however, considerable difficulty was experienced in securing nerve to nerve transmission. In the earlier series it was necessary to resort to intermittent cerebral inoculations in order to conserve the infectivity of the strain.

V. After recovery from an ulcerative kerato-conjunctivitis induced either by croton oil or by the rays from a mercury vapour lamp, rabbits were inoculated intracerebrally with a rabies virus. Examination of the corneal epithelium showed numerous Negri bodies.

VI. It is pointed out that in assessing the immunizing value of rabies vaccine, care must be exercised in the selection of a test dose which is not too severe. Data are supplied showing that 0·1 c.c. of a 5% suspension of virulent brain injected intralingually is a suitable dose for the rabbit. Two-thirds of the control animals were killed within a period of eight to nine days.

Under these conditions, a phenol-killed vaccine, inoculated daily (subcut.) over a period of seven days, afforded a good protection, since 17 vaccinated rabbits out of 20 survived the test dose.—R. E. Glover.

NICOLAU, S., & KOPCIOWSKA, L. (1936). Sur les manifestations d'un ultravirus "saprophyte" dans l'organisme du chien. [**Description of a "Saprophytic" Virus obtained from the Dog**].—*Ann. Inst. Pasteur.* **57.** 244-253. 2 figs. [20 refs.]

An examination of the organs of a series of dogs revealed the presence of intranuclear inclusion bodies resembling those found in the neurones in Borna disease. They were almost invariably present in aged dogs, but were usually absent in young animals. They were confined to the liver and kidneys.

Since the cells which were affected were not the centres of any inflammatory reaction it is postulated that these bodies resulted from the action of a benign virus, which produced well-marked inclusions without inducing any clinical symptoms.—R. E. GLOVER.

WALKIEWICZ, W. (1935). Dalsze badania nad występowaniem miejscowej eozynofilji w jelitach u świn w związku z histologiczną diagnostyką pomoru. [**Local Eosinophilia in the Histological Diagnosis of Swine Fever**].—*Wiad. weteryn.* **14.** 469-476. [2 refs.] [German summary].

Further histological examinations of artificially infected swine confirm the previous results that 24 hours after infection with swine fever a local eosinophilia can be observed in the submucous membrane of the colon and caecum. It appears that the virus of swine fever has the power to attract eosinophile cells in the same manner as can be noted in parasitic diseases. Similarly, in other diseases caused by filtrable viruses such as foot and mouth disease, etc., eosinophilia appears, as well as after the administration of perchloride of mercury or oil of turpentine. As a rule an eosinophilia is found in the submucous membrane of the intestines of old pigs apparently in good health. The author concludes, however, that the local eosinophilia of the intestines may be used as a valuable method in the differentiation of swine fever from other diseases of swine.

—K. SZCZUDŁOWSKI (Lwów).

I. PLOTZ, H. (1936). Nouvelles observations sur la souche de peste aviaire adaptée à la souris. [**Fowl Plague Virus Adapted to the Mouse**].—*C. R. Soc. Biol. Paris.* **122.** 624-625. [6 refs.]

II. HABER, P. (1936). Voies de pénétration du virus de la peste aviaire adapté à la souris. [**Methods of Infection with the Mouse Strain of Fowl Plague Virus**].—*Ibid.* 874-876. [6 refs.]

III. LEVADITI, C., PAÏC, M., HABER, P., & KRASSNOFF, D. (1936). Ultrafiltration et dimensions approximatives du virus de la peste aviaire. [**Determination of the Size of Fowl Plague Virus by Ultrafiltration**].—*Ibid.* 1021-1023. 1 graph. [6 refs.]

IV. PLOTZ, H. (1936). Peut-on parler de "cultures" du virus de la peste aviaire. [**"Cultures" of Fowl Plague Virus**].—*Ibid.* 1034-1036. [3 refs.]

V. LEVADITI, C., & HABER, P. (1936). Evolution du virus de la peste aviaire dans les cellules hépatiques de la souris. [**Cellular Changes in the Livers of Mice Affected with Fowl Plague Virus**].—*C. R. Acad. Sci., Paris.* **202.** 1214-1217. 9 figs. [7 refs.]

VI. LEVADITI, C., & HABER, P. (1936). Affinité du virus de la peste aviaire pour les cellules néoplasiques (épithélioma) de la souris. [**Localization of Fowl Plague Virus in the Cells of Mouse Epithelioma**].—*Ibid.* 2018-2020. [6 refs.]

VII. LEVIN, B. S., & LOMINSKI, I. (1936). Atténuation du virus de la peste

aviaire par les rayons X. [**Attenuation of Fowl Plague Virus by X-Rays**]. —*Ibid.* **203.** 287-288. [1 ref.]

VIII. LEVIN, B. S., & LOMINSKI, I. (1936). Vaccination contre la peste aviaire avec du virus irradié par les rayons X. [**Fowl Plague Vaccination with Irradiated Virus**].—*Ibid.* 350-351. [1 ref.]

I. The strain of fowl plague used by Plotz differs from that of DOERR, SEIDENBERG, and WHITMAN [(1931). *Z. Hyg. InfektKr.* **112.** 732.] in that it cannot be adapted to mice by intracerebral inoculation. On the other hand, cross-immunity and serological experiments indicate that the two strains are alike. Attempts were made to cultivate fowl plague virus in tissue cultures containing mouse embryos, but they were not successful.

II. In addition to intracerebral, intraperitoneal and subcutaneous inoculation, the following methods can be used for the transmission of the virus of fowl plague to mice :- instillation on to the nasal mucous membrane, direct introduction into the stomach by stomach tube, application to the external auditory meatus and intratesticular injection. All attempts at securing infection by corneal scarification or intra-ocular injection failed.

III. Two strains of fowl plague virus, only one of which was pathogenic for mice, were subjected to differential filtration through collodion discs according to the method of ELFORD. Both strains behaved in exactly the same manner. The size of the particles was estimated at 100 to 150 $m\mu$, which is greater than the determination of ELFORD and TODD [*V. B.* **4.** 519.], but is similar to the findings of BECHHOLD and SCHLESINGER [(1931). *Z. Hyg. InfektKr.* **142.** 668].

IV. This article discusses in general terms the symbiosis of fowl plague virus with embryonic tissues and suggests that, under suitable conditions, there must be actual multiplication of the virus as opposed to survival of elements from the original seed material.

V. The inoculation of mice with fowl plague virus gives rise to characteristic changes in the hepatic cells. The initial lesion is a polynuclear leucocytic invasion, which is followed by degeneration of the cytoplasm. At a later stage, a very pronounced fatty infiltration of the cells takes place. In addition, extremely minute cytoplasmic " elementary bodies " can be detected, and oxyphilic inclusions which bear a marked resemblance to Negri bodies.

VI. The mouse strain of fowl plague virus was inoculated into mice which were bearing epithelial tumours. The virus multiplied in the tumour cells producing well-marked necrotic changes, while oxyphilic granules were found in the liver cells.

VII. Virulent fowl plague blood was irradiated with X-rays. Provided that a sufficiently heavy dose of the rays was given the virus was completely inactivated.

VIII. Fowls can be protected against fowl plague by injections of virus irradiated with X-rays, but it is difficult to gauge with precision the exact strength of the exposure that is necessary. If the irradiation is insufficient, the suspension is still capable of killing fowls : on the other hand, an overdose of the rays entirely destroys its immunizing value.—R. E. GLOVER.

TRIPKOVIČ. (1936). Suzbijanje stočne zaraze ovčijih boginja. [**Control of Sheep Pox in Yugoslavia**].—*Jugoslov. vet. Glasn.* **16.** 132-134.

T. has dealt with sheep pox in Dalmatia, Yugoslavia, during the past five years. He says that the former treatment of affected sheep with serum, and the infection of unaffected sheep with a field-made lymph did not give satisfactory results. Much better results were obtained with sensitized lymph. This vaccine is now the only one used in Yugoslavia. It is made at the Veterinary Experimental

Station, Zagreb. It is safe and confers strong and durable immunity, and does not cause disease in unvaccinated animals.—B. Oswald (Skoplje).

I. Levaditi, C., & Schoen, R. (1936). Affinité des virus vaccinal et herpétique pour les éléments néoplasiques du papillome de Shope chez le lapin. [**Affinity of Vaccinia and Herpes Viruses respectively for the Epithelial Elements of Shope's Papilloma**].—*C. R. Soc. Biol. Paris.* **122.** 736-739. 2 figs. [10 refs.]

II. Hyde, R. R. (1936). **Immunity to Virus Myxomatosis as Affected by the Portal of Entry.**—*Amer. J. Hyg.* **23.** 425-430. 1 table. [2 refs.]

III. Hyde, R. R. (1936). **Concerning the Transmission of the Fibroma Virus (Shope) of Rabbits.**—*Ibid.* **24.** 217-226. 4 figs. [9 refs.]

IV. Martin, C. J. (1936). **Observations and Experiments with** *Myxomatosis cuniculi* **(Sanarelli) to ascertain the Suitability of the Virus to Control the Rabbit Population.**—*Rep. Inst. Anim. Path. Univ. Camb. 1934-1935.* pp. 16-38. 1 table, 4 charts. [Numerous refs.]

V. Kidd, J. G., Beard, J. W., & Rous, P. (1936). **Serological Reactions with a Virus causing Rabbit Papillomas which become Cancerous. I. Tests of the Blood of Animals Carrying the Papilloma.**—*J. exp. Med.* **64.** 63-77. 1 fig. on 1 plate, 1 table, 2 charts. [9 refs.]

I. Rabbits bearing the Shope papilloma were inoculated by various routes either with vaccinia or with herpes. In the former case, the virus became localized in the cells of the tumour in which characteristic epithelial changes, with Guarnieri bodies, were produced, whereas, in the latter case, the virus seemed to be incapable of establishing itself in the tumour substance.

II. Rabbits were immunized with Shope's fibroma virus by the subcutaneous, intramuscular, intradermal and ocular routes. When tested subsequently with a myxoma virus which was invariably fatal to normal controls, all the inoculated rabbits proved to be resistant. The size of the tumours resulting from the fibroma virus appeared to play no part in determining the strength of the immunity.

III. Rabbits were infected with the fibroma virus by intranasal or intra-ocular instillations. They were then placed in close contact with normal rabbits, but failed to infect the latter, which were subsequently proved to be completely susceptible to myxoma. Rabbits which were only partially immunized against myxoma by the fibroma virus were also incapable of transmitting the latter to normal controls.

Attempts were made to substantiate the experiments of Berry and Dedrick [*V. B.* **6.** 715.] on the transformation of myxoma virus, rendered inert by heat, into active virus by the addition of fresh fibroma tissue, but the results were entirely negative.

IV. A study of the myxoma virus of the rabbit suggested that it might be of service in the depopulation of areas which have become overstocked. Two strains of the virus were examined by the author : one was possessed of a constant virulence while the other tended to pass through cycles of greater and lesser infectivity. Preliminary experiments showed that the disease was almost invariably fatal. Transmission was easily secured by the injection or ocular instillation of infective material or by the close contact of infected and susceptible animals, but the range of infectivity was not great under cage conditions, although aerial transport and the transmission of infective material by flies played some small part in the dissemination of the disease. Attempts to infect species other than the rabbit were entirely unsuccessful.

With the object of following the course of the disease under more natural

conditions, a colony of normal rabbits was maintained in an open air compound measuring 500 square yards. The disease was started by the introduction of infected animals. In two such experiments with tame rabbits, the colonies were eventually entirely exterminated. Two similar experiments were also undertaken with wild rabbits, and in both instances, the stock succumbed to the disease in a little over a month.

A few rabbits which survived the disease were completely resistant to reinfection and possessed virucidal antibodies in their blood. The progeny of recovered animals, however, seemed to be completely susceptible to the disease. Confirmation was obtained of the reciprocal immunity between myxomatosis and Shope's fibroma.

V. When the Shope papilloma was applied to scarified areas on the skin of rabbits in serial dilutions, the stronger suspensions produced confluent papillomatous growths, whereas weaker suspensions produced isolated lesions with a progressive diminution in number in strict relation to the dilution. By inoculating mixtures of the virus and sera from normal and recovered animals into fresh rabbits, it was shown that the immune sera possessed definite neutralizing properties.

These sera appeared to act, not by modifying or delaying the production of tumours, but by completely suppressing a number of effective virus particles. Rabbits bearing small and discrete tumours produced more potent neutralizing sera than those with large tumours.—R. E. Glover.

PARASITES IN RELATION TO DISEASE (ARTHROPODS).

I. MacLeod, J. (1936). *Ixodes ricinus* **in Relation to its Physical Environment. IV. An Analysis of the Ecological Complexes controlling Distribution and Activities.**—*Parasitology*. **28.** 295-319. 5 figs. [Numerous refs.] [See also *V. B.* **6.** 523].

II. Pogorely, A. I. (1936). Zur Biologie der Zecke Dermacentor silvarum Olen. [**The Biology of the Tick** *D. silvarum*].—*Z. Parasitenk.* **8.** 533-537.

III. Kolomietz, J. S. (1936). Zur Frage der Verbreitung und Lebensweise der Zecke Rhipicephalus rossicus Yak. und Koh.-Yak. in der Ukraine. [**The Distribution and Habits of the Tick** *R. rossicus* **in Ukraine**].—*Ibid.* 538-541. 2 tables.

IV. Rastégaieff, E. (1936). Toxicité des piqures d'*Ornithodorus lahorensis*, Neumann, 1908. [**Mortality in Sheep following Bites of** *O. lahorensis* **Neum.,** 1908].—*Bull. Soc. Path. exot.* **29.** 730-732.

V. Rastégaieff, E. (1936). *Ornithodorus lahorensis* Neumann, 1908, vecteur des hémoparasites du mouton: *Anaplasma ovis* et *Theileria recondita*. [*O. lahorensis* **Neum., 1908, as a Carrier of** *A. ovis* **and** *Th. recondita*].—*Ibid.* 732-733.

I. From the results of laboratory and field investigations it is concluded that the sheep tick, *I. ricinus*, is limited locally by the moisture requirements for survival and development, which are only provided by certain types of inferior hill pasture. The seasonal variation in activity is not due to the succession of broods, as previously supposed, but to the influence of climatic factors on the relative accessibility of parasite and host. The temperature range favourable for parasitization corresponds to the spring and autumn temperatures represented by the weekly air-temperature maxima of 7° to 16°C.

The life-cycle of the tick in nature takes from one and a half to four and a half years. The factors governing its geographical distribution are discussed, and its possible range tentatively delimited.

II. Piroplasmosis of horses in the Ukraine, due to *B. caballi* and *B. equi*, has caused considerable losses in recent years, and in many areas the vectors have not been determined. In Belowodsk two ticks, *D. silvarum* and *Hyalomma volgense*, are found. The occurrence of the former on healthy and affected horses makes this species suspect as a vector of piroplasmosis. A number of laboratory observations on its biology are recorded. [The conditions under which the experiments were drawn up were not critical and render invalid the conclusions drawn on the effect of different factors on development and survival].

III. The doubtful species, *R. rossicus*, has recently been found in the south of the Ukraine, U.S.S.R., and is now accepted by Russian workers as a "good" species. It is a three-host tick, and occurs on animals of forest zones from May to early September, and less frequently on steppe animals. Domesticated animals are also attacked, and it has been found in large numbers on horses suffering from *Babesia equi* infection, of which it is thus a possible vector.

Laboratory studies of the life-history showed that the larva, nymph, and female took 2 to 3, 3 to 4, and 7 to 9 days respectively to engorge. Oviposition occurred in 5 to 11 days after engorgement of the female. Development of the egg, gorged larva, and gorged nymph took 23-26, 8-11, and 15-20 days respectively. The total life-cycle took 77-108 days.

IV. In the course of experiments on the transmission of piroplasmosis, a sheep infected with large numbers of *O. lahorensis* larvae died from a condition the chief clinical symptom of which was paralysis of the four limbs. The onset of paralysis was sudden ; in the evening the sheep appeared perfectly healthy, but on the following morning it was unable to rise, and lay with the neck stiffly outstretched. Immediately prior to death it vomited large quantities of mucus.

The ticks were attached mainly along the back and neck, and it is believed that death was directly due to tick bites, *i.e.*, that the condition corresponds to the tick paralysis obtaining in other parts of the world with such species as *I. holocyclus*, *I. pilosus*, and *D. andersoni*.

V. R. records, without details, the experimental transmission of *A. ovis* and *Th. recondita* to sheep and goats by *O. lahorensis*. These infections had previously been shown to be capable of transmission from sheep to sheep by *R. bursa*, which also transmits "*Piroplasma ovis*", "*Babesiella ovis*", and "*Françaiella ovis*".

—J. MacLeod.

Roubaud, E., & Colas-Belcour, J. (1936). Observations biologiques sur les glossines (*G. palpalis*, *G. morsitans*). [**Biology of Glossina** (*G. palpalis* **and** *G. morsitans*)].—*Bull. Soc. Path. exot.* **29.** 691-696. 2 figs. [2 refs.]

A high mortality occurred in pupae of *G. palpalis* received in Paris from Uganda, and over 70% of those that succumbed were females. A similar higher susceptibility to adverse conditions of temperature and humidity had previously been observed for *G. morsitans*, and the authors suggest that this is a possible explanation of the occasional occurrence of an all-male population in the field.

The authors found that adverse conditions, in addition to producing disturbance of reproductive function in the females, resulted in inability of the females of both species to become fertilized, despite repeated copulation.

A Chalcid, *Syntomosphyrum glossinae*, was reared from some of the pupae obtained, and maintained for one generation on houseflies.—J. MacLeod.

Williams, C. B., & Milne, P. S. (1935). **A Mechanical Insect Trap.**—*Bull. ent. Res.* **26.** 543-551. 2 text figs., 2 figs. on 1 plate, 2 tables.

Davies, W. M. (1935). **A Water-Power Mechanical Insect Trap.**—*Ibid.* 553-557. 3 text figs., 2 figs. on 1 plate.

[Copied *verbatim* from *Trop. Dis. Bull.* **33.** 637. Signed P. A. BUXTON].

These papers describe mechanical devices which cause large funnel-shaped nets to sweep through the air. The propulsion is by electricity or water, and the methods of construction are illustrated. With either apparatus large numbers of small flying insects may be collected, and a study may be made of those which are in flight during particular periods of the day or night. The work is mentioned here because of its potential value to those who wish to sample populations of flying insects, for instance mosquitoes.

PARASITES IN RELATION TO DISEASE (HELMINTHS).

BERTOLINI, G. (1936). Sulla bilharziosi del bestiame in Italia. (Problemi d'ordine parassitologico, sintomatologico ed anatomo-patologico dell' infestazione da *Bilharzia crassa*). [**Bilharziasis of Cattle in Italy**].—*Azione vet.* **5.** 336-343. 8 figs. [13 refs.]

B. considers that the bilharzia he has observed in cattle in Sardinia is not *B. crassa* or, alternatively, that it is a variant of that species, similar to that described by SONSINO in Egypt and by BARBAGALLO in Sicily. He bases this view on anatomical structure, the habitat in the host's body, and on the means of exit of the egg.
—NORMAN BISSET.

HARSHEY, K. R. (1934). **On Amphistome Parasites of Sheep and Goat from Allahabad.**—*Proc. Acad. Sci. U. P.* **4.** 95-106. 4 figs., 2 tables. [10 refs.] [Copied *verbatim* from *Helminth. Abstr.* **3.** 169. Signed B. G. P.]

The amphistomes found by Harshey in indigenous sheep and goats in Allahabad are *Gastrothylax elongatus*, *G. crumenifer*, *Cotylophoron ovatum* n. sp., *C. orientalis* n. sp., and *C. elongatum* n. sp. The 3 new species are described and figured, and keys are given for the species of both genera.

ACKERT, J. E., & REID, W. M. (1936). **The Cysticercoid of the Fowl Tapeworm** *Raillietina cesticillus.*—*Trans. Amer. micr. Soc.* **55.** 97-100. 2 figs. [10 refs.] [Copied *verbatim* from *Helminth. Abstr.* **5.** 32-33. Signed R. T. L.]

Mature cysticercoids were obtained in 16 to 18 days in the beetle *Amara basillaris* by feeding with chicken faeces containing gravid proglottids of *Raillietina* (*Skrjabinia*) *cesticillus*. Adults took 16 days to develop from cysticercoids. A description of the cysticercoid is given.

BAYLISS, H. A. [M.A., D.Sc., Assistant Keeper in the Dept. Zoology, British Museum, National History.] (1936). **The Fauna of British India, Including Ceylon and Burma. Nematoda. Vol. I. (Ascaroidea and Strongyloidea).** pp. xxxvi + 408 + [6]. 182 figs., 1 map. [Numerous refs.] London: Taylor & Francis. [8vo] [25s.]

This is an addition to the collection of monographs on the fauna of British India, and is a summary of existing knowledge, which is as yet, in some respects, very scanty.

Pages i-xxxvi cover a bibliography and systematic classification; pages 1-33 contain an introduction to nematodes in general, and the rest of the book is devoted to detailed descriptions of the worms. An index and a map are also given.—J. E.

I. CERRUTI, C. G. (1936). Sulla microfilariosi ematica dei bovini della Sardegna. Le microfilariosi in Italia. [**Microfilariasis in Italy**].—*Profilassi.* **9.** 10-12. [13 refs.] [French and German summaries].

II. VALCARENGHI, E. (1936). Sul valore della formolo-gelificazione nella diagnosi della filariosi canina. [**Value of Formol-Gelification in the Diagnosis of Canine Filariasis**].—*Ibid.* 59-64. [French and German summaries].

III. SIMONELLI, A. (1936). Sulla filariosi in Umbria. [**Canine Filariasis in Umbria**].—*Nuovo Ercol.* **41.** 169-178. [17 refs.]

I. C. reviews some rare cases of microfilariasis in man and certain wild animals in Italy. He states that, in dogs in Sardinia, *Microfilaria immitis* is comparatively frequent.

He cites certain studies on bovine microfilariasis and describes a case in an ox, discovered accidentally in the province of Cagliari. The embryo concerned measured between 185 and 205μ in length by 7 to 8μ in width, and was furnished with a finely striated cuticle. It was diurnal in habit.

II. V. deals with the clinical and epidemiological aspects of several cases of canine filariasis encountered in different parts of Lombardy. He discusses the use of Gaté-Papacostas' formol-gelification test for diagnosis, but concludes that it is not reliable.

III. The blood picture observed by the author in cases of canine filariasis in Umbria corresponds with that described by other workers. Emetine hydrochloride has been found to be the most effective remedy for the condition, gradually increasing doses, from 1 to 6 cg., being administered on two successive days by intramuscular injection.—NORMAN BISSET.

IMMUNITY.

I. STABLEFORTH, A. W. (1936). L'épreuve de l'agglutination pour le diagnostic de l'avortement épizootique des bovins. Comparaison des suspensions bactériennes, des méthodes et des critères de diagnostic utilisés dans divers pays. [**The Agglutination Test in the Diagnosis of *Brucella abortus* Infection in Cattle. Comparison of Methods used in Different Countries**].—*Bull. Off. internat. Epiz.* **12.** 107-151. Discussion pp. 532-550. 9 tables, 1 chart. [9 refs.]

II. BISANTI, C. (1936). Valeur comparée et indications respectives des méthodes du diagnostic des brucelloses animales. [**Comparison of Different Methods of Diagnosis of Brucella Infections in Animals**].—*Ibid.* 84-88. Discussion pp. 532-550.

III. LOPEZ, C. (1936). Valeur comparée et indications respective des méthodes de diagnostic des brucelloses animales. [**Comparison of Different Methods of Diagnosis of Brucella Infection in Animals**].—*Ibid.* 89-106. Discussion pp. 532-550.

IV. GILMAN, H. L., & CAMERON, H. S. (1936). **The Significance of Low Agglutination Titres in Bang's Disease.**—*Cornell Vet.* **26.** 113-119. 5 tables. [11 refs.]

V. RANNEY, A. F. (1936). **The Significance of Low-Titre Agglutination.**—*J. Amer. vet. med. Ass.* **88.** 242-249. 3 tables.

VI. DONHAM, C. R., & FITCH, C. P. (1936). **Observations pertaining to Standards of Interpretation of Agglutination Titres in the Diagnosis of Bang's Disease.**—*Ibid.* **89.** 176-186. 5 tables. [9 refs.]

VII. DONHAM, C. R., & FITCH, C. P. (1936). **An Important Factor in the Mechanism of Specific Bacterial Agglutination.** *J. infect. Dis.* **59.** 6-10. [4 refs.]

VIII. Tecce, R. (1936). Fractions du sérum et agglutinines anti-brucella. [**Anti-Brucella Serum Fractions and Agglutinins**].—*Boll. Sez. ital. Soc. int. Microbiol.* **8.** 146-148. [7 refs.] [In French].

I. S. in comparing the methods and diagnostic criteria adopted in different countries, in the utilization of the agglutination test for the eradication of contagious bovine abortion, found that the final diagnosis presented great divergence in a considerable number of cases. He shows that this divergence can be attributed to several factors acting together or separately, *viz* – the degree of opacity of the bacterial suspension used, the agglutinability of the organisms, the method of standardization of the suspension, the technique of carrying out the test, or the criteria adopted in the actual interpretation of the test.

Suspension was obtained from workers in Germany, Norway, Denmark, France, Austria and United States of America, for comparison with the suspension issued to the requirements of the Agricultural Research Council in Britain. Fifty sera were tested simultaneously with each of these suspensions, using the method appropriate to each. The results show striking divergence in the final diagnosis as it would be made in each of these countries, *e.g.*, with the British suspension, 20 sera were classed as positive, 23 as doubtful and 7 as negative; the corresponding figures for Germany are 4, 2, 44 and for U.S.A., 26, 24, 0.

It is further shown that the agglutination test as used may fail to detect infection in animals just before parturition or abortion, and that other possible means of diagnosis should, therefore, be investigated.

II. Two methods for the diagnosis of brucella infections in animals are briefly referred to, *viz* – (1) the differentiation of *Br. melitensis* and *Br. abortus*: the value of Petragnani's medium [*V. B.* **4.** 503.] which inhibits the growth of *Br. abortus* has been confirmed by Italian workers, and (2) allergic reactions obtained by the intrapalpebral inoculation of " Brucellina Mirri " [*V. B.* **5.** 637]. This substance gives rise to a marked specific reaction in sheep and goats, and has proved of great service in the eradication of brucella infections in these animals. Less satisfactory results have been obtained from its use in cattle.

III. In this report L. submits results which show the close correspondence between test-tube agglutination and complement-fixation methods for the diagnosis of brucella infections. It was found, however, that there was little agreement between the results of these two methods and those obtained by allergic methods. By experimental inoculation of sheep it was shown that agglutinins and complement-fixing bodies are present some considerable time before the allergic state is manifest. In a number of cases agglutinins had completely disappeared from the sera before intradermal inoculation of antigen evoked the allergic response, and for this reason the latter test has a value in detecting certain types of latent infection.

IV. As a result of testing 100 bovine sera, of varying brucella agglutinin content, against 15 antigens made from organisms other than brucella, that either do infect cattle or might do so, the authors conclude that low agglutination titres in brucellosis are not due to cross-agglutination with these organisms.

V. As a result of the uncertainty of the procedure to be adopted in respect of animals classed as suspicious by the agglutination test, the results obtained in the repeated testing of 7,942 cattle in 255 herds were analysed. Of 213 animals which subsequently became positive, 100 were completely negative and 113 showed titres ranging from partial agglutination at 1 : 25 to partial at 1 : 100 at the test immediately preceding the one on which they were diagnosed as reactors. It would appear that low agglutination titres usually have little significance relative to the titre expected on subsequent tests.

VI. Differences in opinion as to the agglutination titre to be considered as

evidence of infection with *Br. abortus* are shown to be responsible for a variation of from 3·8 to 33% in the number of animals which would be classed as suspicious by different laboratories. The interpretation of the agglutination reaction is further complicated by the presence of non-specific agglutinins in the sera of most cattle. It is shown that the range of specific and non-specific agglutination overlaps and, therefore, in the interpretation of low titre agglutination, it is necessary to take into consideration the history of the entire herd.

VII. D. and F. produce evidence to show that the water included in the antigen preparation may exert an inhibitory effect on agglutination. They found that, in the plate method of serum-antigen mixture [*V. B.* **4.** 325 and 326.], a considerably greater number of bacteria were agglutinated in a much shorter time than in the test tube method employing the same amount of serum. By using negative bovine serum instead of salt solution, as the suspending medium for the bacteria in the antigen preparation, or by mixing dried *Br. abortus* organisms with the serum under test, it is shown that the specific agglutinin content of some sera is significantly higher than when water is used as the suspending medium for the antigen.

VIII. Experiments reported in this paper indicate that, in g. pigs, agglutinins for *Br. abortus* and *Br. melitensis* are associated with the euglobulin fraction of the serum. There is, however, some slight association between the pseudoglobulin fraction and agglutinins for *Br. melitensis*.—N. J. SCORGIE.

I. SARNOWIEC, W. (1936). Essai d'application de la réaction de précipitation au diagnostic des brucelloses. **[The Precipitation Reaction in the Diagnosis of Brucella Infection]**.—*C. R. Soc. Biol. Paris.* **121.** 1144-1146.

II. JULLIEN, J., & LAURENT, P. (1936). Diagnostic biologique des brucelloses humaines et animales par la floculation des sérums en présence d'un antigène spécifique. **[Biological Diagnosis of Brucella Infection in Animals and Human Beings by Serum Flocculation]**.—*Pr. méd.* April 29th. pp. 718-719. [2 refs.]

I. S. used the precipitation test on 115 blood samples, using the slow agglutination test as a control. The results agreed in 86 of the samples. 13 samples gave a positive aggl. and a negative precip. reaction; 10 samples gave a negative aggl. and a positive precip. reaction; 6 samples doubtful to the aggl. reaction gave one doubtful, four negative and one positive precip. reactions.

He considers that the two tests if carried out systematically on a farm are of equal value.

II. J. and L. found that the flocculation test is specific for brucellosis in human beings and animals. They distinguish three different grades of flocculation.
—P. L. SHANKS.

BOUVIER, G. (1936). Essais de formol-gélification de divers sérums animaux. **[Formol-Gelification Tests of Various Animal Sera]**.—*Ann. Soc. belge Méd. trop.* **16.** 37-42. [9 refs.]

B. submitted the sera of 50 cattle, 13 goats, 8 sheep and 101 dogs of the Belgian Congo to the formol-gel test. He found that from 70 to 100% of the cattle, whether healthy or affected with *Tryp. congolense*, gave positive reactions. He eliminated *Tryp. theileri*, and tuberculosis, contagious abortion and other bacterial diseases as causes of these reactions. Thirteen trypanosome-free goats gave similar reactions. Those of sheep were more specific, but were absent unless they had been infected with *T. congolense* for more than a month. One dog gave a rapid reaction with opacity, but was negative to other tests for kala-azar. All the dogs were apparently

healthy but 49 reacted with simple retarded gelification, 6 reacted doubtfully and only 45 gave negative reactions.

B. concludes that the test is of no value for animals in the Belgian Congo.

—C. V. Watkins.

I. Ramon, G., Richou, R., & Djourichitch, M. (1936). Nouvelles recherches sur l'immunité antistaphylococcique naturellement acquise chez le cobaye. **[Naturally Acquired Antistaphylococcic Immunity in the Guinea Pig].**—*C. R. Soc. Biol. Paris.* **122.** 606-609. [2 refs.]

II. Djourichitch, M. (1936). Sur la présence de staphylocoques toxigènes et d'antitoxine staphylococcique chez le cobaye neuf. **[Toxin-Producing Staphylococci and Staphylococcus Antitoxin in the Guinea Pig].**—*Ibid.* 609-611. [2 refs.]

III. Ramon, G., Djourichitch, M., & Richou, R. (1936). Du rôle de l'infection staphylococcique et de la contagion dans l'acquisition de l'immunité antitoxique spécifique, démonstration expérimentale. **[The Part Played by Staphylococcus Infection and Contagion in the Acquisition of Specific Antitoxic Immunity].**—*Ibid.* 611-613. [4 refs.]

I. The authors present evidence tending to prove that contagion plays a part in the production of naturally acquired staphylococcus immunity in the g. pig.

II. Among g. pigs belonging to two groups only a few were found to harbour toxigenic staphylococci in the pharynx. It was found possible to detect antitoxin in the blood even though organisms were not present in the pharynx.

III. When g. pigs are infected by the oral route with staphylococcus culture, a specific antitoxin is produced. These results were found to be similar to those obtained by thè injection of staphylococci into the conjunctiva of the rabbit.

—S. J. Edwards.

Boivin, A., & Mesrobeanu, L. (1936). Recherches sur les antigènes somatiques et sur les endotoxines des bactéries. II. L'antigène somatique complet (antigène O) de certaines bactéries est le constituant principal de leur endotoxine. **[The Somatic Antigens and Bacterial Endotoxins. II. The Complete Somatic Antigen (" O " Antigen) of Certain Bacteria and the Principal Constituent of their Endotoxin].**—*Rev. Immunol.* **2.** 113-144. 10 tables. [Numerous refs.] [See also *V. B.* **6.** 441].

It is usually held that, in the *coli*-typhoid group, " S " strains give the complete somatic or " O " antigen, which is not found in the " R " strains. There are exceptions to this rule, however ; there is no absolute correlation between the appearance of the colonies, the stability of their suspensions, and the presence or absence of the complete antigen. The " R " strains of the same group have only a feeble toxicity, and this has been shown to be due to bacterial protein, whereas the greatly increased toxicity of " S " strains is due, in part to bacterial protein, but mainly to the complete somatic antigen or acid-soluble part of the endotoxin. The toxicity of the complete antigen varies from one strain to another and, while greater for the rabbit than for the mouse, depends largely upon the dose employed. Several small doses give complete immunity to large doses of the same substance, with the appearance of agglutinins, precipitins and antitoxins in the blood.

—A. W. Taylor.

Bruynoghe, G. (1936). La nature des agglutinogènes. **[Nature of Agglutinogens].**—*C. R. Soc. Biol. Paris.* **122.** 94-95. [5 refs.]

B. investigated the nature of agglutinogens and concluded that agglutinogens

A and B are proteins and that the supplementary agglutinogens M and N are lipids.—P. L. SHANKS.

I. GOEBEL, W. F. (1936). **Chemo-Immunological Studies on Conjugated Carbohydrate-Proteins. X. The Immunological Properties of an Artificial Antigen containing Glucuronic Acid.**—*J. exp. Med.* **64.** 29-38. 6 tables. [13 refs.] [See also *V. B.* **5.** 229].

II. GORET, P. (1936). Antigénothérapie. [**Antigen Therapy**].—*Rec. Méd. vét.* **112.** 385-394.

I. Artificial carbohydrate protein antigens containing the azobenzyl-glycosides of glucose and glucoronic acid give rise to distinct, immunologically specific antibodies in rabbits. The antigen bears a striking relationship to the specific bacterial polysaccharides of pneumococcus Types II, III and VIII.

II. In this general review of the types and uses of bacteria and their products in the treatment of disease, G. discusses the action of curative vaccines, which action would appear to be due partly to protein shock and partly to the specific immunity induced. The term " antigen therapy " is suggested as being preferable to " vaccine therapy ".—A. W. TAYLOR.

SIMITCH, T. V., DJOURICHITCH, M., & SOLONSKA, L. (1936). L'immunité locale et la vaccination par voie trachéale. [**Local Immunity and Vaccination by the Tracheal Route**].—*Rev. Immunol.* **2.** 465-472. 3 tables. [8 refs.]

This represents an attempt to confirm or to contradict the " local immunity " theory of Besredka. G. pigs and rabbits were immunized with diphtheria anatoxin by the intratracheal and subcutaneous routes. Antitoxin was demonstrated, *i.e.*, a negative Schick reaction was obtained at the same time after inoculation in each case. The immunity produced, whether tested *in vitro* or *in vivo*, was also approximately the same in both cases. It is claimed that these results do not favour the theory of local immunity.—A. W. TAYLOR.

I. RAMON, G. (1936). Les vaccinations associées-étude théorique. Résultats d'ensemble-indications pratiques. [**Associated Vaccinations**].—*Rev. Immunol.* **2.** 415-436. 2 tables. [Numerous refs.]

II. SACQUEPÉE, E., PILOD, M., & JUDE, A. (1936). L'immunisation antidiphtérique chez l'adulte au cours des vaccinations associées triples antidiphtérique, antitétanique et antityphoparatyphoïdique. [**Triple Associated Vaccination against Diphtheria Tetanus and Typhoid-Paratyphoid**].—*Ibid.* 437-449. 4 tables. [7 refs.]

I. Some ten years ago, R., when examining numbers of antidiphtheria sera, found that the best serum was produced by horses with an abscess at the point of inoculation. In pursuing this line of inquiry, it was found that sterile tapioca inoculated at the same time as the vaccine produced the best result. To improve the effect of vaccination with tetanus anatoxin in man, tapioca was found to produce too severe a reaction, so a bacterial vaccine, namely, typhoid vaccine, was substituted for it. Such was the origin of associated vaccines.

It was then found that each antigen in the mixture produced its own specific immunity in a considerably enhanced degree.

Much of the paper consists of favourable reports, notably from the army, of the use of associated vaccines of various kinds consisting mainly of two or more of the following antigens :– tetanus, diphtheria, typhoid and paratyphoid.

II. It would appear that, in adults vaccinated with a diphtheria-tetanus-typhoid-paratyphoid associated vaccine, the diphtheritic immunity is equal, if not

superior, to that produced by the anatoxin alone, or anatoxin mixed with typhoid-paratyphoid vaccine. Immunity is acquired eight days after the last injection and would appear to persist for a considerable period.—A. W. TAYLOR.

DISEASES, GENERAL.

DAVIS, C. L., & SHORTEN, H. L. (1936). **Granulomatous Nasal Swelling in a Bovine.**—*J. Amer. vet. med. Ass.* **89.** 91-96. 4 figs. [10 refs.]

D. and S. isolated a species of *Helminthosporium* in pure culture from tumorous nodules involving both sides of the nasal septum in a ten-year-old cow. They consider, however, that another agent, in the form of capsulated spherical bodies with granular contents found on section within giant cells and also free in the tissue, were responsible for the lesions. As fungi of the genus *Helminthosporium* are not known to be pathogenic for animals, the species isolated is considered to be of doubtful importance, unless it proves to be a normal contaminant of the nasal mucosa which has assumed pathogenic properties.—NORMAN BISSET.

WYLIE, A. M. (1936). **Grass Disease in Essex.**—*Vet. Rec.* **48.** 1018-1019. 1 fig.

A case which resembled clinically the subacute form of grass sickness is described as occurring in Essex.—J. R. GREIG.

KOCH. (1936). Ueber die Störungen der Fruchtbarkeit der Füchse. [**Reproductive Disorders of Foxes**].—*Dtsch. Pelztierz.* No. 2. pp. 7. 1 fig. [1 ref.] [Abst. from reprint].

As silver foxes in Germany and elsewhere produce only some 50% of the maximum possible progeny, K. considers that they suffer from sterility. He says that the commonest cause is ovarian insufficiency, that " prolan " has given unsatisfactory results and that " unden ", an ovarian extract, has given good results.—J. E.

HØST, P., & SVEINSON, S. (1936). Arvelig katarakt hos hunder. [**Inherited Cataract in Dogs**].—*Norsk VetTidsskr.* **48.** 244-270. 5 figs. [8 refs.] [English summary].

H. collected records of more than 60 cases of bilateral cataract in pointers in Scandinavia, all of which were descended from a single Finnish pointer. It is, therefore, well established that the abnormality is hereditary and dominant in its nature. The cataracts appeared at varying ages (generally in dogs two to three years old), but did not affect all of the descendants, seeming to be limited to certain strains of the family.

The changes of the lens were somewhat different from the commoner types of cataract described in dogs, being especially localized at the periphery.

Metabolism experiments carried out by SVEINSON with one of the affected dogs revealed no evidence of systemic disturbance which could be proved to have any connexion with the affection.—GUSTAV NAERLAND (OSLO).

BYERLEY, T. C., & OLSEN, M. W. (1936). **Certain Factors affecting the Incidence of Malposition among Embryos of the Domestic Fowl.**—*Poult. Sci.* **15.** 163-168. 1 fig., 3 tables. [9 refs.]

The four common malpositions of embryos in eggs have been investigated, and previous work confirmed. Certain malpositions are associated with the position of the egg during incubation, *e.g.* egg lying horizontally, large end up, or small end up. The authors' work indicates that turning the egg during the third week

of incubation has no effect on either malpositions or on hatchability and is, therefore, unnecessary during that period. Eggs incubated for the first 42 hours small end up, and then incubated large end up, showed a slight increase in hatchability and a slight decrease in the number of malpositions.—P. L. SHANKS.

I. BLAKEMORE, F. (1936). **Fowl Paralysis. I. The Results of an Investigation into Thirty-Eight Outbreaks.**—*Rep. Inst. Anim. Path. Univ. Camb. 1934-1935.* pp. 39-50. 2 figs., 1 appendix. [16 refs.]

II. BLAKEMORE, F., & GLOVER, R. E. (1936). **Fowl Paralysis. II. Experiments on Transmission.**—*Ibid.* pp. 51-64. 9 tables. [8 refs.]

III. DALLING, T., & WARRACK, G. H. (1936). **Observations on Fowl Paralysis (Lymphomatosis).**—*Vet. J.* **92.** 310-321. 5 tables.

I. B. reports the results of an investigation into outbreaks of fowl paralysis on 38 farms embracing 38,500 fowls. Information was obtained by questionnaires, personal visits and *post-mortem* examinations. The disease was not associated with any particular form of poultry husbandry, and occurred most frequently in birds of from five to seven months of age. There was an average mortality of 14%. Attention is drawn to the high incidence of iritis in some outbreaks, and the significance of pigment change in the eye is discussed.

Attempts were made to diagnose latent cases by blood examinations, complement-fixation tests, etc. without result. Particular attention was paid to methods of spread; egg transmission or purchase of infected stock were apparently responsible in many instances, but other methods were possibly of importance. Evidence regarding spread from infected to healthy stock was inconclusive. The incidence of parasites in stock affected by fowl paralysis was no higher than in unaffected birds.

II. This article describes a small-scale experiment in the transmission of neurolymphomatosis by inoculating tissues from infected birds into chicks raised from fowl paralysis-free parents. In the first series, three-month-old chicks were inoculated by various routes with different tissues. The disease appeared in 18·2%, while uninoculated controls were free from lesions. In a second series, very young chicks from two to four weeks old were used with an incidence of the disease of 15%. Attempts were made to secure serial transmissions from both groups, but with the exception of one bird in the first passage experiment, the results were entirely negative.

The results of feeding young chicks with tissues from affected fowls were entirely negative, but confirmation of transmission through the egg was obtained, an incidence of 57% in the progeny of infected birds being noted.

III. In this paper, D. and W. report the results of some extensive experiments on neurolymphomatosis. The experimental birds were raised from (a) " susceptible " stocks in which lymphomatosis was present, and (b) " resistant " stocks where parents were apparently free from the disease.

In the first series, 193 susceptible and 187 resistant birds were divided into groups each of which received a particular tissue suspension from birds affected with fowl paralysis. Suitable controls were injected with material from normal birds. Some evidence was obtained that the injection of affected tissues played a part in transmitting lymphomatosis, but much depended on the type of bird used. Spread by contact was also investigated in various ways, but no definite evidence of transmission was obtained.

The incidence of neurolymphomatosis in the progeny resulting from the crossing of different breeds of hens, with susceptible and resistant cockerels, was also examined. The conclusions which were drawn are as follows :–

"(a) Incubation and rearing play no part in the causation of lymphomatosis . . . . (b) The four cockerels we used with the 50 pullets seemed to play no significant part in the resulting incidence in their progeny. (c) Groups of pullets selected for apparent 'susceptibility' and 'resistance' to lymphomatosis failed to furnish clear evidence of these qualities in their progeny. (d) Individual pullets seemed to have a considerable amount of influence in the fate of their progeny. (e) Pullets in whose ancestors lymphomatosis has existed to a marked degree do not necessarily produce affected progeny. (f) Pullets in whose ancestors there is no evidence of lymphomatosis may produce progeny in which the condition occurs to a marked extent. (g) Infected dams do not always produce affected progeny. (h) Sister pullets ('resistant' or 'susceptible') do not necessarily all behave alike in the production of affected or healthy progeny. (i) Mating of father and daughter or brother and sister is not followed by a greater incidence of lymphomatosis than when the birds are crossed. . . ."

It is suggested that all experimental work of this nature should extend over a lengthy period, since birds may develop symptoms and lesions up to three years of age.

No evidence was found that intestinal parasitism played any part in the causation of the disease.—R. E. Glover.

Heiss, K. (1936). Die Marek'sche Hühnerlähme. [**Fowl Paralysis (Review)**].—*Münch. tierärztl. Wschr.* **87.** 253-258. [Numerous refs.]

A report presented to a veterinary congress at Stuttgart. H. reviews the literature regarding fowl paralysis and concludes that it is probably caused by a filtrable virus.

The method by which it is spread upon poultry farms, the different types of paralysis occurring in fowls, the relationship to other diseases such as leucaemia and coccidiosis, and to intestinal worms and nutritional deficiencies, protein intoxication and in-breeding are discussed.

Details for diagnosis by histological examination of nervous and other tissues are given.

From the point of view of meat inspection the disease is reported to be relatively unimportant unless tumours are present.

The general control measures advocated include the following :-

Accredited breeders' stock should be examined for eye lesions of fowl paralysis at least once a year. A cytological examination should be made of the blood of breeding cockerels. Stricter veterinary control should be exercised at laying trials. Breeders are advised not to return their entries to their home flocks. Isolation of purchased stock, vigorous culling and strict hygiene should be practised.

The sale of chicks or pullets from infected farms should be prevented by law. Chicks should be reared on virgin soil isolated from the remainder of the flock and attended by separate staff. Breeders of registered strains should be required to have morphological blood tests carried out upon their birds before using the eggs for hatching purposes and should be subjected to special disease control measures should the disease occur.—K. D. Downham.

Gullickson, T. W., Palmer, L. S., & Boyd, W. L. (1935). **A Rickets-Like Disease in Young Cattle.**—*Tech. Bull. Minn. agric. Exp. Sta.* No. 105. pp. 47. 8 figs., 9 tables. [Numerous refs.]

The authors investigated this disease as it occurred in Minnesota. It was associated with the common practice of fattening calves for meat by keeping them confined and allowing abundant concentrate and little hay. The symptoms include progressive stiffness, swollen joints, and weak bones, liable to break; general deterioration in health – anorexia, dyspnoea, tympany, rough coat, etc.

The disease was experimentally reproduced by feeding normal calves on the same diet as that giving rise to the natural cases, the diets and blood sera being assayed continuously for Ca and P content.

It was found that there was a deficiency in Ca, in vitamins D and in P, which could be abolished by giving appropriate supplements. Affected beasts could be cured unless the bone changes had gone too far.

The American literature on similar diseases and on their pathogenesis is discussed.—J. E.

SCHERMER. (1936). Untersuchungen über die in Nordschleswig auftretende Lecksucht der Rinder. [**Pica of Cattle in North Schleswig**].—*Berl. tierärztl. Wschr.* **52.** 549-553. 3 figs., 5 graphs.

The author studied pica in cattle in North Schleswig, chiefly from the angle that it is an acidosis. By means of dissociation curves and blood analysis it was proved that a considerable upset of the acid-base equilibrium was a feature of the condition. It appears doubtful whether the acidosis can be cured by better feeding. The number of experimental animals used was rather small to warrant conclusive statements.—JAMES STEWART.

HELLER, V. G., & PENQUITE, R. (1936). **Factors Producing and Preventing Perosis.** [Copied *verbatim* from *Poult. Sci.* **15.** 424].

The data in the report summarize a study using a thousand chickens at various seasons during a four-year period. A basic perosis producing diet, frequently recommended, contains 66 percent corn, supplemented with cereals and protein concentrates, invariably produces perosis in 60 to 100 percent of the chickens at any season of the year. This condition is not prevented by incorporating in the ration various types of mineral supplements which vary the calcium-phosphorus ratio, or the acid-base balance : if anything, the larger amounts of minerals aggravate the condition.

Perosis is prevented by a heat-stable water soluble extract of certain plant products, notably, the water extract of rice bran, if the chickens are given this drinking solution *ad libitum*.

The potent content of this water extract seems not to be due either to its mineral content or to the commonly recognized water soluble Vitamin B or G, as neither the ash of the rice bran, or heated or unheated yeast are equally effective as preventives.

PALLASKE, G. (1936). Ueber eine spontane Avitaminose bei Schafen mit besonderer Berücksichtigung der Veränderungen am Zentralnervensystem. [**Spontaneous Avitaminosis in Sheep, with Special Reference to Lesions in the Central Nervous System**].—*Arch. wiss. prakt. Tierheilk.* **70.** 278-291. 4 figs. [7 refs.]

A nervous disorder affecting young lambs, especially after poor winter feeding, is described. Unfortunately the *post-mortem* findings are only recorded for one animal. The principal lesions were found in the central nervous system. Histological examination revealed marked degeneration in the medulla, mid- and forebrains. It was considered possible that the disease might be due to a vitamin deficiency, especially of either A or B. This hypothesis received a certain measure of support from the fact that the disease was apparently cured by the administration of yeast and good hay.—JAMES STEWART.

HERTZ, J. (1936). **On the Constructive and Destructive Processes in the Bones and Teeth of Normal and Scorbutic Organisms.**—*Acta path. microbiol. scand.* **13.** 329-349. 17 figs. on 14 plates. [Numerous refs.] [In English].

The Hansen-Häggquist syncytial conception of cartilages is discussed, differentiation being made between the endoplasm surrounding the nuclei and the exoplasm. In direct ossification the endoplasm increases, forming the osteoblastema, and in the exoplasm are formed collagen fibrils around which lime salts are deposited. In the perichondrial ossification osseous tissue forms in preformed non-fibrillar cartilage, and enchondral ossification commences with deposition of lime along the periphery of the cartilage. Under conditions of necrosis, bone breakdown is preceded by a disappearance of lime and collagen, the latter forming granulative tissue, leaving unmasked protoplasm which later becomes osteoclasts. Osteogenic tissue then grows into the decomposing necrotic bone regions, forming osteoblastema which in turn forms osseous tissue. The healing of uncomplicated fractures is preceded by a traumatic inflammation with production of granulation tissue, osteoblastema differentiates with new deposition of lime and collagen, forming osteoid trabeculae, and the normal enchondral ossification then follows.

In fracture healing in scorbutic organisms the inflammatory process is delayed and the osteoblastema is of inferior quality, formed with very little collagen content, although the lime deposition may be heavy. There is apparently no enchondral ossification. If bone fragments are substituted the normal breakdown processes occur, but the lack of differentiated osteoblastema delays the reconstruction. Similarly, under scorbutic conditions in the teeth, the odontoblastema is but poorly differentiated, dentine formation is reduced and irregular, and odontoporosis sets in owing to the lack of lime and collagen, but in the enamel changes are less marked. Addition of vitamin C increases the animal's capacity for differentiation of osteoblastema, thus reorganizing the dentine, and direct ossification begins anew in the alveolar bone. Broadly speaking, scurvy thus primarily inhibits the formation of the most highly differentiated tissues. The relationship of scorbutic dental changes to caries and pyorrhea is briefly discussed.—ALFRED EDEN.

PUBLIC HEALTH.

I. ANON. (1936). **The Milk (Special Designations) Order, 1936, dated April 18th, 1936, Made by the Minister of Health under Section 3 of the Milk and Dairies (Amendment) Act, 1922.**—*Statutory Rules & Orders, Gt. Brit.* No. 356. pp. 13. London: H.M. Stat. Off. [4d.]

II. ANON. (1936). **Milk (Special Designations) Order, 1936.**—*Circ. Minist. Hlth, Gt. Brit.* No. 1533. pp. 9. [2d.]

I. The Milk (Special Designations) Order of 1936 provides for four grades of milk – " Tuberculin Tested ", " Accredited ", " Tuberculin Tested (Pasteurized) " and " Pasteurized ". These grades displace the old forms of " Certified ", " Grade A Tuberculin Tested ", " Grade A ", and " Pasteurized ". In connexion with the examination of the above standards of milk, the Minister of Health has laid down that " Tuberculin Tested " and " Accredited " milk must satisfy a methylene blue reduction test and must be found to contain no coliform bacilli in one-hundredth of a millilitre. The milk must not decolourize the methylene blue within the specified time, *i.e.*, from May 1st to October 31st, in four and a half hours, and from November 1st to April 30th, in five and a half hours. " Tuberculin Tested (Pasteurized) " milk and " Pasteurized " milk must satisfy the plate count test, and must not contain more than 100,000 bacteria per millilitre. The designations in the new order are less likely to lead to confusion than those in the previous order.

II. In the circular letter on the Milk (Special Designations) Order, 1936,

issued by the Minister of Health, further explanations are given with regard to the terms upon which producers' licences are granted and the directions for applying for licences to produce "Tuberculin Tested" and "Accredited" milks. The intervals between tuberculin tests must not be more than six months. In the case of bottled milk, further prevention of contamination is provided for in that an overlapping cap, with or without a disc, must be used on the bottles. The manner of carrying out the clinical examination of animals, and the test for the number of bacteria per millilitre, are set out in Memorandum 139/Foods, and the manner of carrying out the tuberculin tests is set out in Memorandum 197/Foods.

—BRENNAN DEVINE.

I. JEFFS, H. B. (1936). Le contrôle du lait au Canada. [**Milk Control in Canada**].—*Bull. Off. int. Hyg. publ.* **28.** 88-99. 1 table.

II. FRANK, L. C. (1936). Les progrès dans l'assainissement du lait aux États-Unis. [**Milk Control in the United States of America**].—*Ibid.* 100-104. [1 ref.]

III. COFFEY, D. J. (1936). La législation sur le lait dans l'état libre d'Irlande, en ce qui concerne la production et la distribution du lait pur, destiné à la consommation humaine. [**Milk Control in the Irish Free State. Production and Distribution of Pure Milk for Human Consumption**].—*Ibid.* 124-128. [1 ref.]

IV. ANON. (1936). **New Zealand's Municipal Milk-Supply.**—*Lancet.* **231.** 212-213.

I. In the Provinces of Ontario, New Brunswick, Saskatchewan, Alberta, Manitoba, New Scotland and the Prince Edward Island, the producers and sellers must be licensed. Pasteurization is encouraged, though not obligatory. In the Prince Edward Island all the milking herds are free from tuberculosis. The regulations provide that the milk shall contain at least 3·5% butter fat and 11·75% solid matter, and have a density of 1028.

II. In the United States of America the aim is to reduce the incidence of tuberculosis among milch cows, to increase the practice of pasteurization, and to promote the adoption by different local governments of uniform and efficacious legislation for the control of milk. The production of certified milk, which is the highest quality of raw milk, is encouraged, and where this is not obtainable, pasteurization is recommended. Under the Social Security Act, eight million dollars annually have been voted to help local authorities to establish and maintain an efficient service of public hygiene, which includes clean, healthy milk. In the year 1934, 2,010 cases of undulant fever in man were reported, and, as a result, 212,000 herds were examined for brucellosis. Owners of reacting cattle are indemnified by the Federal Government. Of the herds examined up to June 30th 1935, 38% contained infected animals.

III. In the Irish Free State, under the Infectious Diseases (Prevention) Act of 1890, the Medical Officer of Health has power to inspect dairies from which milk suspected of having transmitted infectious disease has been delivered. The law of the Dairy Produce Act of 1924 makes the sale of dirty milk and contaminated cream an offence, and the Milk and Dairies Act of 1935 provides for the registration of milk sellers. The revocation of the registration of a milk seller takes place when he is proved to be guilty of selling contaminated milk after three infringements within a period of five years. Extensive powers are given to the local government in connexion with the construction and cleanliness of dairies, receptacles and utensils, and the bottling and distribution of milk. The legislation is mainly designed to ensure the supply of clean milk, and further measures are taken to

combat bovine tuberculosis. The consumption of milk per head in the Irish Free State is much below that in Switzerland, Norway and the United States of America.

IV. Wellington has established a municipal milk supply. The corporation buys its milk from a co-operative dairy farmers' organization. The supply is collected within a 60 mile radius of the city, except in the summer months, when the area is diminished to a 30 mile radius. In the 30 miles' area the milk is collected in corporation motor lorries. It is purchased by weight and on butter-fat content, the standard of butter-fat being 3·25 % ; the average works out at 4·2 %. The milk is not standardized, but is sold with the full butter-fat content as received.

The corporation insists upon the milk being produced under stringent hygienic conditions. The farms are inspected by corporation officers and samples of milk are taken for chemical and bacteriological analysis. The milk is delivered to the consumers in bottles, and paid for by metal tokens.

Rather more than 85 % of the householders in Wellington obtain their supplies through the municipal scheme. Capital, amounting to £103,400, for running it, was raised by loan. Under the scheme high quality, clean milk is supplied at a reasonable cost, and financially it has proved a success.—BRENNAN DEVINE.

THERAPEUTICS AND MATERIA MEDICA.

CANU, L. (1936). Osservazioni sulle elminthasi degli agnelli e loro trattamento. [**Treatment of Helminthiasis in Lambs**].—*Clin. vet., Milano.* **59.** 60-65. [20 refs.]

In three enzootics of helminthiasis in lambs in Sardinia, intestinal tricho-strongylosis predominated over the gastro-intestinal type. The author advocates the administration of either a solution of copper sulphate and sodium arsenite in acidulated water, or carbon tetrachloride in doses of 0·25 c.c.—N. BISSET.

MISTRORIGO, R. (1936). Sulla terapia della ascaridiosi dei polli. [**Treatment of Ascarid Infestation in Fowls**].—*Clin. vet., Milano.* **59.** 512-517. [14 refs.]

M. describes the experimental treatment of 320 fowls infested with *Heterakis inflexa.* Of these, 105 were given tetrachlorethylene in 1 c.c. doses in gelatin capsules, and 215 were given carbon tetrachloride in 3 c.c. doses by means of a small syringe with a rubber tube attached to the nozzle. M. concludes that the second treatment gave better results than the first.—N. BISSET.

MÜSSEMEIER, F. (1936). Sur l'état actuel des recherches concernant la prophylaxie chimiothérapique de la brucellose des bovins en Allemagne. [**Results of Research on Chemotherapy of Bovine Contagious Abortion in Germany**]. —*Bull. Off. internat. Epiz.* **12.** 152-164. Discussion pp. 550-556. [1 ref.]

RUZICKA, J. (1936). La chimiothérapie des brucelloses animales. [**Chemotherapy of Brucella Infection in Animals**].—*Ibid.* 165-172. Discussion pp. 550-556. [6 refs.]

M. describes investigations carried out in Germany, mainly by Götze and partly by the Reichgesundheitsamt, on numerous chemicals (methylene blue, " trypaflavine ", " targesine ", " benzoptol ", " naganol ", phenol and several compounds of proprietary manufacture).

R. refers to similar preparations tested in various European countries.

No known drug has any specific value in the treatment of bovine brucellosis. —J. E.

I. Costigan, S. M. (1936). **Effectiveness of Hot Hypochlorites of Low Alkalinity in Destroying Mycobacterium tuberculosis.**—*J. Bact.* **32.** 57-63. 4 tables. [5 refs.]

II. Heicken, K. (1936). Die keimtötende Wirkung überhitzten Wasserdampfs. [**Disinfectant Action of Superheated Steam**].—*Zlb. Bakt. I. (Orig.).* **136.** 249-255. 2 figs., 1 table. [4 refs.]

III. Heicken, K. (1936). Zur Desinfektion von Metallkäfigen und Steingut-töpfen. [**Disinfection of Metal Cages and Earthenware Vessels**].—*Ibid.* 244-249. 1 fig., 3 tables. [2 refs.]

I. Solutions of sodium hypochlorite of low alkalinity, containing 50 parts of available chlorine per million parts of water, when heated to 50°C. destroy tubercle bacilli in two and a half minutes and, if heated to 60°C., destroy them in 30 seconds. Stronger solutions, containing 200 parts per million of available chlorine, kill tubercle bacilli in one minute at 50°C. Very large numbers of tubercle bacilli were killed in these experiments, but only culture suspensions were tested, so that the protective effect of mucus, pus, etc., against this disinfectant was not investigated. Hot solutions of hypochlorite are widely used for the disinfection of dairy and catering utensils.

II. Spores of members of the genus *Bacillus* were killed in about 10 minutes by the action of steam at 100°C. Superheated steam proved less destructive and, at 135°C., took 35 minutes to destroy spores. When superheated to 150°C. spores were killed in 10 minutes, and even more rapidly at a higher temperature. The failure of superheated steam to destroy spores is explained by its " dryness " which prevents rapid penetration of the heat into the spores. Temperatures of 150°C. and higher will destroy spores when applied absolutely " dry " as in a hot air oven.

III. Experiments on the steam sterilization of metal cages and earthenware pots containing dung, in a sterilizer containing steam at 105°C. It was sometimes two and a half hours before the entire mass of the dung lying in a plant of this kind, in a layer 3 cm. deep, reached a temperature of 100°C., and one and a half hours before it reached 80°C. These and other figures, relating to deeper layers of dung, indicate the difficulties to be anticipated in the steam sterilization of cages contaminated with anthrax and other heat-resistant organisms.—E. J. Pullinger.

PHYSIOLOGY.

Egehøj, J. (1936). Svinets Lymfekarsystem med saerligt Henblik paa dets Betydning for Kødkontrollen. [**Topography of the Lymphatic System in Swine**].—*Skand. VetTidskr.* **26.** 329-396. 3 figs. [Numerous refs.] [English summary].

Under the heading " general considerations ", E. describes the different techniques used in his investigations and gives a general survey of the anatomical and histological structure of the lymph nodes and lymph vessels. In a separate part of the work the lymphatic systems of the various regions are topographically described, also the lymph nodes and the territory drained by each group of them. The regional systems dealt with are :– (1) the head and neck ; (2) the fore legs ; (3) the thorax including the lungs, the scapular, dorsal, lateral thoracic and sternal regions ; (4) the abdominal cavity including the digestive tract, liver, spleen and kidneys ; (5) the loins ; (6) the abdominal wall ; (7) the udder, and (8) the hind legs.—Gustav Naerland (Oslo).

NELSON, W. O. (1936). **Endocrine Control of the Mammary Gland.**—*Physiol. Rev.* **16.** 488-526. 1 fig. [Numerous refs.]

N. makes a detailed survey of the hormonal factors concerned in lactation, with special reference to the changes which normally occur in the mammary gland during the sexual cycle, in pregnancy and lactation.

NORMAL DEVELOPMENT.

Normal prepubertal development of the mammary gland consists of a more or less progressive growth of the ducts. With puberty there is further proliferation, a growth dependent on the ovary and correlated with the sexual cycle. The character of proliferation during the oestrous cycle varies considerably from one species to another. It can be correlated with the type of cycle, and shown to be parallel to the degree of follicular and luteal activity. In animals whose cycle is characterized by a persistent corpus luteum, the mammary gland undergoes extensive development, to the compound tubulo-alveolar stage. Where the luteal phase is absent or of short duration, the glandular proliferation extends the duct system with little or no development of the lobule-alveolar system, *i.e.* the gland is not carried beyond the compound tubular system. During pregnancy the gland shows progressive duct and lobule development. As pregnancy reaches its later stages the alveoli show evidence of secretory activity. With parturition lactation is initiated, and continues for a period in keeping with the requirements of the offspring.

EXPERIMENTAL DEVELOPMENT.

(a) EFFECT OF OESTRONE.—There are distinct species differences in the response of the mammary gland to oestrone. At the one extreme are the dog and cat which show only duct stimulation, and at the other the guinea pig which exhibits proliferation of all mammary elements. The relation of oestrogenic substances to mammary cancer is an absorbing question, as recent findings seem to indicate that the prolonged administration of certain oestrogenic substances will lead progressively to proliferation of the glandular elements, adenomata and finally to highly malignant carcinoma.

(b) EFFECT OF PROGESTERONE.—The weight of evidence at present indicates that, in combination with oestrone, progesterone induces development of the lobule-alveolar system of most animals to the condition seen in mid-pregnancy. The g. pig gland is an exception as progesterone produces little, if any, change beyond that induced by oestrone alone.

(c) EFFECT OF OVARIAN GRAFTS.—Successful grafts stimulate the atrophic glands of castrated females, and lead to marked proliferation of the male gland.

(d) RELATION OF THE PITUITARY TO LACTATION.—The initiation and maintenance of lactation appear to depend on the presence of the pituitary gland. Lactation is apparently controlled by an anterior lobe hormone specifically related to milk secretion. Stimulation of lactation by anterior hypophyseal extracts has been reported in the g. pig, rabbit, ferret, squirrel, goat, sow, heifer, cat and monkey. The hypothesis is put forward that, during pregnancy, the ovarian hormones induce the proliferative changes that occur in the mammary glands but that, during the latter phases of pregnancy when the glands are fully prepared for lactation, they inhibit the actual secretion of the milk, both by suppressing the release of lactogenic hormone from the pituitary and by a direct inhibitory effect on the gland. The inhibitory factor is believed to be oestrone or an allied substance, but some evidence points to a possible participation of the corpus luteum as well.

Posterior lobe extracts seem to have no actual action as galactogogues apart from their action on the discharging mechanism. It has been generally accepted

that the act of suckling reflexly stimulates the production of the lactogenic hormone by the hypophysis, and that the involution of the mammary glands after weaning is conditioned by the withdrawal of the nervous stimulation of suckling, rather than by the accumulation of the products of secretion.

Methods of extracting the lactogenic hormone are discussed, also its chemical and physical properties and methods of assay.—A. ROBERTSON.

I. BUTOZAN, V. (1933). Prilozi pitanju normalne leukocitarne krvne slike kod teladi u starosti od 6 do 10 nedelja. [**The Normal Leucocyte Blood Picture of Calves from Six to Ten Weeks Old**].—*Vet. Arhiv.* **3.** 108-143. 18 tables, 3 charts. [18 refs.] [German summary].

II. ERCEGOVAC, D. (1935). Prilozi pitanju normalne kvantitativne i kvaltativne krven slike kod ovaca. [**The Normal Quantitative and Qualitative Blood Picture of Sheep**].—*Ibid.* **6.** 244-264. 11 tables. [18 refs.] [German summary].

These two papers are studies of the subjects indicated in the titles. The originals must be consulted for details.—B. OSWALD (SKOPLJE).

I. JAARSMA, R. (1936). Chemisch drachtigheidsonderzoek. [**Chemical Tests for Pregnancy**].—*Tijdschr. Diergeneesk.* **63.** 899-905. [13 refs.] [English, French and German summaries].

II. CUBONI, E. (1936). Ricerche su due reazioni di gravidanza nella cavalla. Nota preventiva. [**Pregnancy Diagnosis in the Mare (Chemical Test)**].—*Clin. vet., Milano.* **59.** 1-4. [German summary].

III. ROMANO, R. (1936). Sulla diagnosi di gravidanza con il metodo Cuboni. [**Cuboni's Pregnancy Test**].—*Ibid.* 422-425.

I. It has been shown that free histidine is sometimes present in the urine of pregnant women, and J. found that, when histidine was added to the urine of dogs, cattle or pigs, its presence could be detected either by the bromine test or by the Konrad-Long test. However, free histidine could not be demonstrated in the urine of pregnant bitches, cows or sows by either of these methods; they are, therefore, of no value in the diagnosis of pregnancy in animals.

II. Experiments were carried out to determine at what time Friedman's test and Cuboni's test [*V. B.* **6.** 379.] first give positive reactions. Samples of blood and urine were collected from 13 mares, but only two animals proved to be pregnant. In both cases, Friedman's test gave a positive reaction two months after the last service, whereas Cuboni's test did not give a positive reaction until the third month.

III. In order to determine the value of Cuboni's test, samples of urine were collected from mares, stallions and cows. A positive reaction was only given with urine from mares which were proved later to have been pregnant. It is claimed that a modified form of the test is equally satisfactory for the diagnosis of pregnancy in cattle.—J. A. NICHOLSON.

TECHNIQUE.

BISCOE, J., PICKELS, E. G., & WYCKOFF, R. W. G. (1936). **An Air-Driven Ultracentrifuge for Molecular Sedimentation.**—*J. exp. Med.* **64.** 39-46. 1 text fig., 6 figs. on 3 plates. [6 refs.]

Details are given of an air-driven ultracentrifuge for molecular sedimentation. This instrument, like the standard oil-driven machine of Svedberg, uses large rotors, giving a 6·5 cm. distance between cell centre and rotation axis. As in

Svedberg's apparatus for the sedimentation of molecules in solution, a small volume of the solution is enclosed in a cell that can be rotated at high speeds. Where the dissolved substance has a density different from that of the solvent there will be a gradual separation of the two kinds of molecules, due to the intense gravitational field produced by the rotation. The extent of this separation can be measured by photographing through the moving cell. The method used in the apparatus described is based on changes in absorption, the chosen light being such that it is transmitted by the solvent but absorbed by the solute.—A. ROBERTSON.

MISCELLANEOUS.

DYKINS, W. A. (1936). **Duties and Status of a Municipal Veterinary Officer.**—*Vet. Rec.* **48.** 1049-1053.

An outline is given of the duties of a municipal veterinary officer in a large town in South Africa.

ABATTOIR ADMINISTRATION.—Veterinarians are in supreme charge, and have a status which is far in advance of that obtaining in the British Isles. They are assisted by meat inspectors (holding the certificate of the Royal Sanitary Institute) and " learner meat inspectors ". Meat inspection is conducted in accordance with instructions issued by the Government.

MILK HYGIENE.—Administration in Durban is entrusted to the Medical Officer of Health, the Veterinary Officer acting as a consultant. It is contended that this work should be under the direct administration of the Veterinary Officer. The dairies are periodically inspected by municipal veterinary surgeons, but the bacteriological examination of milk is carried out by the Union Health Department, although D. considers that this should be done at a municipal veterinary laboratory.

TRANSPORT.—The Veterinary Officer has complete control of all municipal transport performed by animals. The cost in Durban for horse, vehicle and driver is 1s. per hour.—H. E. BYWATER.

OFFICIAL AND OTHER REPORTS.

GREAT BRITAIN. (1936). **Report of the Agricultural Research Council for the Period October 1933 – September 1935.** pp. 130. 3 appendixes. London : H.M. Stat. Off. [8vo] [2s.]

The Provisional Note of Administrative Arrangements was revised in August, 1935 (Appendix I). The latter lays down the procedure by which the Agricultural Research Council gives advice on agricultural research to the agricultural departments and to the Development Commission. Under the revised note the Agricultural Research Council is authorized to carry out research at centres of their own or elsewhere, and to employ staff for the purpose.

The special committees originally set up by the Agricultural Research Council, to enquire into the more important animal diseases, and to recommend additional researches, continued their work during 1933, 1934 and 1935.

The following selections in the report are of special interest :

ANIMAL HEREDITY AND GENETICS.—The main institutes concerned with this subject are the Institute of Animal Genetics, Edinburgh, and the Small Animal Breeding Research Institute, Cambridge. In both institutes work on the genetics of poultry was continued. Reference is made to the Conference convened in May, 1935, to discuss the practical and scientific problems of pig-breeding.

Animal Physiology and Nutrition.—In addition to research in animal nutrition carried out at the School of Agriculture, Cambridge, and at the Rowett Institute, Aberdeen – the two centres specially established for research on this subject – feeding experiments on sheep are in progress at the School of Rural Economy, Oxford; on pigs at Rothamsted Experiment Station, etc.; on cattle at the National Institute for Research in Dairying, Reading, and at the Hannah Dairy Research Institute, Ayr; on poultry at the Harper Adams College and at the South-Eastern Agricultural College, Wye.

Animal physiology is dealt with at Cambridge and Aberdeen. In addition, this subject is studied at Reading, and at the Institute of Animal Genetics, Edinburgh. Biochemists are working on animal problems at the Veterinary Laboratory, Ministry of Agriculture, Weybridge; the Institute of Animal Pathology, Cambridge; the Moredun Institute, and at the Veterinary Colleges, Edinburgh and London.

The question of the importance of nutrition in relation to health has engaged the close attention of the Council and of the Joint Committee on Iodine Deficiency and Thyroid Disease. Research on iodine and magnesium deficiency has been carried on at the Veterinary Laboratory, Weybridge – the latter in co-operation with Moredun Institute and at the Institute of Animal Pathology, Cambridge – and work on phosphorus deficiency is in progress at Cambridge.

Diseases of Animals.—The report refers to the shortage of trained investigators and the agricultural departments were asked to consider the possibility of extending the studentship scheme.

The formation of the Scottish Board of Research in Veterinary Science is mentioned; its primary functions are to co-ordinate, control and supervize schemes of veterinary research in Scotland.

The Agricultural Research Council considered schemes of research at the Royal Veterinary College, London, and at the Royal (Dick) Veterinary College, Edinburgh, and made certain recommendations about staffing and finance.

Under the heading "Special Researches", a review of the work carried out by the specialist committees on the following is given:– braxy, tuberculosis, brucella infection, Johne's disease, mastitis, swine fever, necrotic enteritis, helminth diseases, sheep blowflies, fowl paralysis and coccidiosis. Attention is drawn to the work on BCG vaccination at the Institute of Animal Pathology, Cambridge, the experimental scheme of eradication of bovine contagious abortion and the problem of immunization against this disease, to the survey diseases of young pigs, field work on the sheep blowfly, and to research on fowl paralysis.

Under "Miscellaneous Researches", work on blackhead in turkeys and disabling disorders of horses and the investigations of the Bureau of Animal Population, Oxford, are reviewed.

In Appendix III a list of grants sanctioned by the Council for the period is given, and also a complete index of personal names, government departments, institutions and other bodies and scientific subjects included in the report.

—J. C. Wallace.

Scotland. (1936). **The Hannah Dairy Research Institute. Annual Report for the Year Ending 31st March, 1936.** [Wright, N. C.] pp. 20. 3 plates. Kirkhill, Ayr: Hannah Dairy Res. Inst. [8vo].

Investigations have been made into a number of problems connected with the dairy industry and one section deals with the subject of the control of disease in dairy cattle.

In the report published in 1933 it was shown that, with the incentives of free

tuberculin testing and advice, 28 of the 30 herds in the area in which tuberculosis is being controlled [*V. B.* **7.** 3.] had made substantial progress. During the past year all these herds have been re-tested in order to ascertain the permanence of the previous results, and their influence on the policy of neighbouring farms. The value of segregation methods in the control of cont. bov. abortion and mastitis is also being investigated. Improved methods for the laboratory diagnosis of mastitis are being studied.

A comprehensive survey of the design and operation of existing pasteurizing plants has been issued in bulletin form [*V. B.* **6.** 725]. The presence of tubercle bacilli in pasteurized milk was found to be associated with gross defects not only in the design of the plant concerned, but also in its operation. Valuable recommendations for securing greater efficiency throughout the entire pasteurization process are made. A study of the modified methylene blue test as an alternative to the plate count for the bacteriological grading of milk is reported, in which many controversial factors are given particular attention.—S. J. Edwards.

Australia. (1936). **Ninth Annual Report of the Council for Scientific and Industrial Research for the Year ended 30th June, 1935.** pp. 108. 1 table. Canberra: L. F. Johnston, Commonwealth Govt. Printer. [fcp] [4s. 8d.]

Matters relating to animal health are dealt with in this report in the work of the Divisions of Economic Entomology, Animal Health and Animal Nutrition.

Entomological Investigations.

The principal investigations relate to the buffalo fly pest, transmission of *Anaplasma marginale* by insect vectors, and the sheep blowfly pest. In the studies on the last, attention was paid to the substances which attract or repel blowflies, in the hope of discovering chemical compounds which attract the primary fly (*Lucilia cuprina*) to live sheep, and in order to increase the value of traps containing baits. Relatively simple attractive fractions of protein substances have been produced and the work suggests that attractiveness may be bound up with the sulphur linkage in protein.

Investigations of the problem of susceptibility support two conclusions:—(a) that the primary factor in susceptibility is the presence of free moisture in the fleece and on the skin, and (b) that anatomical, physiological and pathological conditions act either by supplying moisture, or by ensuring its retention long enough for the area to become attractive to the flies. Carcass disposal is recommended as a useful way of diminishing strike, and for this purpose the thorough poisoning of all parts of the carcass with sodium fluoride, as a powder or sodium arsenite in solution, is recommended. It was found that intensive trapping reduces the incidence of strike markedly, but it is not yet known whether this will prove an economically practicable control measure.

The influence of the Mules operation for the surgical removal of crutch wrinkles on diminishing susceptibility to strike has been investigated, as also the relationship of susceptibility to strike with wool colour. A new dressing for the treatment of strike, consisting of various esters of glycerin and boracic acid, has been found to be non-irritant to the skin, to kill the maggots slowly but effectively, to protect the wound and to assist healing and, under conditions of the experiments, effectively to prevent strike for a considerable period.

Animal Health Investigations.

These investigations covered a wide field. At Townsville, North Queensland, the development of the complement-fixation test for the diagnosis of cont. bov. pl.-pneumonia has been satisfactorily concluded. Its reliability has been amply

demonstrated in Victoria and in New South Wales. The morphology and phylogenetic relationships of the causal organism of pl. pneumonia have been studied [*V. B.* **7.** 111]. It was found possible to set up typical disease in cattle by exposing them to an atmosphere in which were suspended finely atomized cultures of the organism, isolated and repeatedly sub-cultured over 12 months. Arrangements have been made for the distribution of large quantities of vaccine prepared from sub-cultures of the organism.

Further work at the Townsville station was carried out in connexion with "peg-leg" disease and the tick-borne infections. The spread of *Anaplasma centrale* amongst experimental cattle kept free from all ticks suggests the possibility that winged vectors or other ectoparasites may be the transmitting agents.

McMaster Laboratory.—Genetic investigations on fertility in the merino sheep have been initiated.

Parasitological Investigations.—The importance of the oesophageal reflex was shown in determining the efficiency of anthelmintic medication and, as a result, the efficiency of copper sulphate in combination with 40% commercial nicotine sulphate was demonstrated in trichostrongylosis of sheep.

Further work was carried out on the treatment of the sheep nodule worm, *Oesophagostomum columbianum*. No reasonable degree of efficiency was obtained by oral administration of any of the drugs tested. Eventually, a method of administration of sodium arsenite *per rectum* by means of the automatic bluestone drenching gun was developed, and field trials of this have given encouraging results.

Chabertia ovina was shown to be of considerable pathogenic importance in its immature stages, particularly in young sheep, while further investigations were carried out on the resistance of the eggs and larvae of gastro-intestinal nematodes and the effect of certain mineral elements on the resistance of sheep to haemonchosis.

Work on the problem of tick paralysis in dogs was concluded, a large number of natural cases having been treated successfully with the serum of immunized dogs. Preparations of derris root, both as a watery suspension and as a powder, proved highly lethal for engorged and semi-gorged ticks, and acted as a repellant for four days.

Bacteriological investigations under consideration included those on foot-rot, caseous lymphadenitis and bovine mastitis. It was shown that the Preisz-Nocard bacillus can be recovered from the alimentary tract of sheep and, as the result of a field trial, that lambs shorn at grass and never entering shearing sheds might still contract the disease.

In South Australia, studies on caseous lymphadenitis have shown that an immune serum can be produced in sheep by repeated inoculation of heat-killed organisms, though so far such immune sheep serum has not conferred even a passive immunity when injected into g. pigs. Investigations on allergic reactions have been continued and production of a diagnostic agent seems to be possible.

A comprehensive bibliography on bovine mastitis has been compiled.

At the Veterinary Research Institute, University of Melbourne, field tests of vaccines (*Fusiformis necrophorus* anaculture) against foot-rot appeared to give satisfactory results in cattle, but not in sheep.

In the study of infectious enterotoxaemia it was found that the toxin content of the bowels of animals dying of the disease showed great variability, being highest in the lower portion of the small intestine. A test is in progress to determine the value of vaccination of pregnant ewes in conferring protection on lambs after birth. In Western Australia field observations indicate that vaccination is a successful means of preventing enterotoxaemia.

Further studies include those on "coast disease", bovine haematuria and pregnancy paralysis.

Indications were obtained that deaths from botulism in sheep, horses and poultry follow the ingestion of water contaminated by carrion.

ANIMAL NUTRITION INVESTIGATIONS.

A further study of the relationship between protein intake and wool production has proved the importance of this constituent in the diet of wool sheep. Investigation of concentration of blood phosphate in sheep grazing under different conditions showed that continuous depasturing on areas very low in P does not lead to any evidence of P deficiency. Sheep under natural grazing conditions in Australia are extremely economical in their requirements of P.

It has been shown, in connexion with " coast disease " occurring in sheep grazing on the plain shell-sand soils in the coastal regions of Southern Australia, that the administration of minute quantities of cobalt salts will lead to dramatic improvement in the affected animals.

The influence of high concentrations of Ca and Mg on the assimilation of phosphate by growing sheep was also investigated. It was found that sheep absorbed phosphate normally when fed with large excess of Ca and Mg carbonates. This effect suggests that the prevailing idea, that the sheep is unable to assimilate P as efficiently in the form of the relatively palatable tricalcic phosphate, as it does in the dicalcic or mono-calcic phosphate, is incorrect. After seven months, in the experimental sheep, there was no difference in the groups receiving bone meal, dicalcic phosphate or Christmas Island rock phosphate, but the group receiving P as commercial superphosphate was not doing so well. The high fluorine content of the latter supplement is the possible cause of this.

Investigation of the effects of continual ingestion of fluorine by sheep was continued. After two and a half years, experimental sheep which had ingested from 115 to 150 mg. of fluorine per day are now showing definite symptoms of chronic fluorosis. On the other hand, groups which received up to 80 mg. of fluorine each day have continued to do as well as the control sheep. These results suggest that phosphatic supplements which have a fluorine : phosphorus pentoxide ratio of less than 0·04 might be fed with confidence, and that no untoward effects of chronic fluorosis would ensue.—I. CLUNIES ROSS.

INDIA (CALCUTTA). (1935). **Twelfth Conference of Medical Research Workers held at the School of Tropical Medicine, Calcutta from 26th November to 1st December, 1934.** pp. iii + 210. Simla : Govt. India Press.

The following items are of veterinary interest. Research on rabies vaccination was carried out at the Central Research Institute, Kasauli. Fixed virus inactivated by the photodynamic action of methylene blue was of no value as a vaccine. " Buffalo antirabic serum " had no neutralizing action on fixed virus. A vaccine consisting of a 5 % carbolized suspension of brain tissue from sheep infected with Paris virus gave inconclusive results when tested on monkeys. A single injection of a live fixed virus alone or virus mixed with antirabic serum or euglobulin and pseudoglobulin fractions of such serum (alone or together), protected from 70 to 80 % of monkeys against artificial infection with street virus 21 days later.

TUBERCULOSIS.—SOPARKAR found that bacillaemia was general in fowls infected with virulent [? avian] strains of *Mycobact. tuberculosis*. Colonies from blood cultures made from fowls differed markedly from those of classical types of tubercle bacilli.

HELMINTHOLOGY.—MAPLESTONE presented a progress report on *Gnathostoma spinigerum* infestation in cats, which is of frequent occurrence with the monsoon.

—J. E.

INDIA, CEYLON. (1935). **Administration Report of the Government Veterinary Surgeon for 1934.** [CRAWFORD, M.] pp. 16. Colombo: Govt. Press. [8vo] [20 cents].

ANTHRAX.—303 goats died from anthrax in quarantine, and nine in Colombo. BOVINE TUBERCULOSIS is a rarity in Ceylon; only one out of 40,800 cattle slaughtered for food was affected, and a few cattle at Kandy reacted to the tuberculin test. Tuberculosis was diagnosed in a dog, for the first time in Ceylon. HAEMORRHAGIC SEPTICAEMIA occurred in Ratnepura. BOVINE BRUCELLOSIS was also diagnosed for the first time in Ceylon in 1934 at the Government Dairy, Colombo: 15 out of 137 cattle at the dairy reacted (agglutination test).

RINDERPEST, which was confined to one small area in 1933, was not reported after May and is now evidently eradicated. No pains are being spared in preventing its reappearance. Cattle and goats are imported in limited numbers from India, and are placed in quarantine before admittance to the country. It is intended to develop Trincomalee as a new quarantine station. FOOT AND MOUTH DISEASE was reported; there were 3,668 cases with 79 deaths. 87 cases of RABIES were reported, and at the Pasteur Institute, Colombo, 173 positive diagnoses were made [subject not mentioned]. Jackals were thought to be important agents in the transmission in the North-Western province.

" PSEUDO FOWL PEST " [Newcastle Disease].—Outbreaks occurred continually.

Oestrus ovis was found in sheep and goats.

SCHISTOSOME eggs were found in liver lesions in one horse and one goat; also in nasal discharge from many cattle afflicted with " snoring ", near Colombo. The horse was an English thoroughbred which had been a " dry sweater " for a year. Its liver was studded with pin-head to small pea-sized pearly white nodules, in which eggs resembling those of *S. spindalis* were found. The goat liver was similar. The eggs recovered from the cattle resembled *S. nasalis*.

FILARIAL INFESTATIONS.—Embryos were found in the blood of three fowls, one of which showed elephantiasis of the comb and wattles.

A list of diseases diagnosed by laboratory methods is given; in addition to the above, it includes references to piroplasmosis in cattle and dogs, and to one case of Johne's disease.

Animal husbandry is dealt with in detail.

Animal Census :– 78,839 cattle, 9,187 buffaloes, 6,679 sheep and 84,180 goats.

—J. E.

TRINIDAD AND TOBAGO. (1936). **Report of the Veterinary Division [Department of Agriculture], 1935.** [METIVIER, H. V. M.]—*Adm. Rep. Dep. Agric. Trin. Tob. 1935.* pp. 44-46.

LIVESTOCK " PROCLAIMED " DISEASES.—Four outbreaks of anthrax occurred in the summer and were controlled by the vaccination of in-contact animals. 1,160 dairy cows in Port of Spain were tuberculin tested and the 10 reactors were slaughtered. The same procedure was followed with all the cattle at the government stock farm, 22 reactors being found at the first test, and 6 at a second test, four months later (December).

Paralytic rabies was limited to the north of Trinidad, and occurred in 331 cattle. A campaign for bat eradication resulted in the destruction of 3,669 bats. 4,500 cattle were vaccinated against this disease during the year.

" NON-PROCLAIMED " DISEASES.—Tetanus was observed in animals in one herd and ulcerative lymphangitis in large American mules.

A few cases of bovine brucellosis occurred; it is intended to use a formolized

vaccine in control. Notice was also given of ophthalmia and pneumonia in calves, dermatitis in equines and parasitic gastritis in cattle.

Livestock importation and quarantine statistics are given.—J. E.

BOOK REVIEWS.

Ross, I. C. [Director, McMaster Anim. Hlth Lab., C.S.I.R.; Lecturer, Vet. Parasitology, Univ. Sydney], & Gordon, H. McL. [Res. Officer, McMaster Anim. Hlth Lab.; Demonstrator in Vet. Parasitology, Univ. Sydney]. (1936). **The Internal Parasites and Parasitic Diseases of Sheep. Their Treatment and Control.** pp. xx + 238. 35 text figs., 84 figs. on 46 plates, 2 tables. [Numerous refs.] Sydney: Angus & Robertson Ltd. [8vo] [25s.]

This book is of a highly specialized nature, dealing only with the parasitic worms of sheep and the diseases which they cause. The subject is discussed much more fully than it has been possible to do in the several text-books of general medical and veterinary helminthology which have recently been published. The production of mutton and wool hold a more important place in the animal husbandry of Australia than in that of any other country in the world. It is, therefore, very fitting that such a book should come from two Australian workers. As they point out in the introduction, the great importance of helminthic disease is an adequate excuse for its publication.

Although the work is highly specialized it is not highly technical, and great pains have been taken to render it as simple and easy to understand as possible so that the sheep-farmer may be able to use it with advantage. It has not, however, been the authors' aim to teach helminthology to the sheep-farmer, but to enable him to obtain as much information as possible from a book written for the scientific worker.

The arrangement of the information which the book contains is the usual one—a description of the morphological characters of groups and species, followed by an account of life-histories, disease production, symptoms, pathology, treatment and general control. Particular pains are taken over the helminthiasis of Australian sheep, but the sheep-parasites which have not, as yet, been found in Australia also receive some consideration.

Fascioliasis, parasitic gastritis and nodular disease are dealt with at the greatest length and it is interesting to compare the account with the record of our experiences in Great Britain. R. and G. state that the nodular worm occurs in Great Britain, which statement is open to question; and one or two of the observations on parasites do not altogether tally with what is seen in Great Britain. Diarrhoea is stated to be an invariable symptom of trichostrongylus infestation, whereas, in the severe outbreak of disease caused by worms of this genus in England in 1933-1934, we had ample opportunity of observing the dry and hard nature of the faeces which appeared to be characteristic. The observations are reversed for haemonchosis, which is characterized by diarrhoea in this country but apparently not in Australia.

A brief section towards the end of the book deals with methods of collection and preservation and of diagnostic procedure, and an appendix gives a brief account of the relationship of the parasites of the natural mammalian fauna of Australia to sheep.

The text is clearly written and well illustrated by many original and well-chosen drawings and photographs. Errors in the printing are remarkably few: a

reference to the appendix on p. 162 appears to be wrong, and " larva " wrongly appears in the plural on p. 80. The index is good and the short glossary of scientific terms completes a very valuable addition, for the use of laymen and scientific workers alike, to the literature on sheep diseases.—E. L. TAYLOR.

NEVEU-LEMAIRE, M. (1936). Traité d'helminthologie médicale et vétérinaire. [**Manual of Medical and Veterinary Helminthology**]. pp. xxiii + 1514. 787 figs., numerous tables. Paris : Vigot Frères. [8vo] [Fr.175].

This weighty tome on medical and veterinary helminthology is worthy of a master of compilation, such as Neveu-Lemaire has shown himself to be, and deserves a place in all biological, parasitological, medical and veterinary libraries, and the isolated worker on parasitology who finds himself cut off from the library facilities of university and other centres will find it of particular value.

N-L. points out that it is the only comprehensive work of its kind to appear in France since the classical treatises of NEUMAN in 1892, of RAILLIET in 1895, and of his own previous work published in 1912. A revision of the previous work would have entailed the production of several volumes, knowledge of the subjects having grown so prodigiously, and N-L. found it necessary to confine his attention to the helminths.

The work is divided into four parts, the first of which, occupying 74 pages, deals with general helminthology. After a very brief historical sketch it outlines the location, methods of reproduction, life histories and geographical distribution of helminths ; and, as concerns the host, the pathological, humoral and cellular reactions. Finally we are given a brief account of helminthological technique – how to search for and examine parasitic worms and their eggs.

The second section takes up the greater part of the book, some 1,284 pages, and is devoted to the detailed consideration of the parasitic nematodes, cestodes, trematodes and acanthocephala of man and of the domestic animals and birds, including some 44 mammalian and 40 bird hosts, but excluding the fur-bearing animals.

The third part, comprising some 40 pages, gives a systematic arrangement of the various parasites under the headings of hosts, and the fourth part, 76 pages in length, consists of a systematic arrangement of intermediate hosts and the parasites which they carry. The second and last parts are well illustrated by line drawings ; there is a brief bibliography of references to the principal general sources which have been consulted in the preparation of the work. A good index completes the book.

One of the features of the work which may be regarded as new, and which enhances its usefulness very considerably, rendering reference quick and easy, is the presentation of specific differences in the form of tables. Symptomatology, pathology, aetiology, diagnosis, treatment and prophylaxis are dealt with, although briefly, in each and every instance where anything is known about them, but the literature on treatment and prophylaxis does not appear to have been read with thoroughness, and much of the recent American, South African, Australian and British work on treatment and general control is not included. The book is essentially a work for the systematic zoologist. As such it should be of the greatest service to medical men and veterinarians and can be recommended as a most trustworthy and lucid guide to the specific determination of parasitic helminths and to their systematic arrangement.—E. L. TAYLOR.